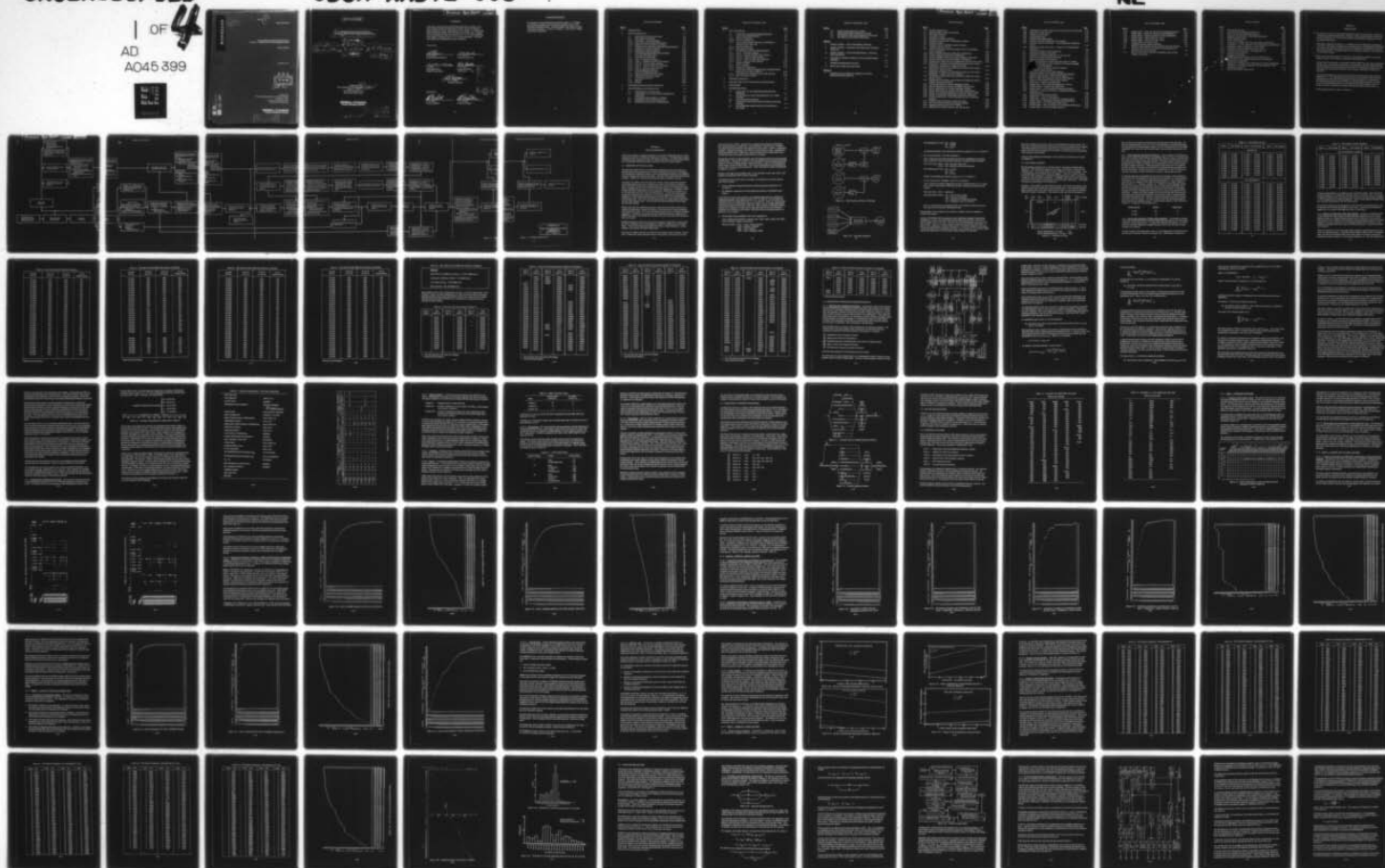


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F-106 SCHEDULED MAINTENANCE STUDY, PHASE III, PREDICTIONS AND R--ETC(U)
SEP 72 L J BROWN, K E MARKS, G WANG
GDCA-AHD72-005 F41608-71-D-1383
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GDCA-AHD72-005

**F-106 SCHEDULED MAINTENANCE STUDY
PHASE III - PREDICTIONS AND RECOMMENDATIONS**

FINAL REPORT

September 1972

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Prepared for
Service Engineering Contract F41608-71-D-1383
Request No. VE12
San Antonio Air Materiel Area
Kelly Air Force Base, Texas

GENERAL DYNAMICS
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F-106 SCHEDULED MAINTENANCE STUDY,
PHASE III, PREDICTIONS AND RECOMMENDATIONS,

9

FINAL REPORT,

10 L. J. Brown, F. E. Marks,
Gordon / Wang, R. S. Grote J. R. Cooper

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Sep 1972

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Prepared for

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Kelly Air Force Base, Texas

GENERAL DYNAMICS

Convair Aerospace Division

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FOREWORD

This report was prepared by the San Diego Operation of Convair Aerospace Division of General Dynamics for the San Antonio Air Materiel Area, Kelly AFB, Texas, under Request VE12, change 1, to Engineering Services Contract F41608-71-D-1383 dated 18 February 1972. Request VE12 is administered under the direction of Mr. A. K. Olsen (SAMMER), Task Monitor, assisted by Capt. G. A. Morgan (SAMMER). This document fulfills the requirements of CDRL Item B009.

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SECTION 1

INTRODUCTION

↙ The objective of the F-106 Scheduled Maintenance Study was to formulate a method for examining the scheduled maintenance program in terms of both inspection content and interval suitable for any aircraft and to optimize that maintenance program on a cost and effectiveness basis.

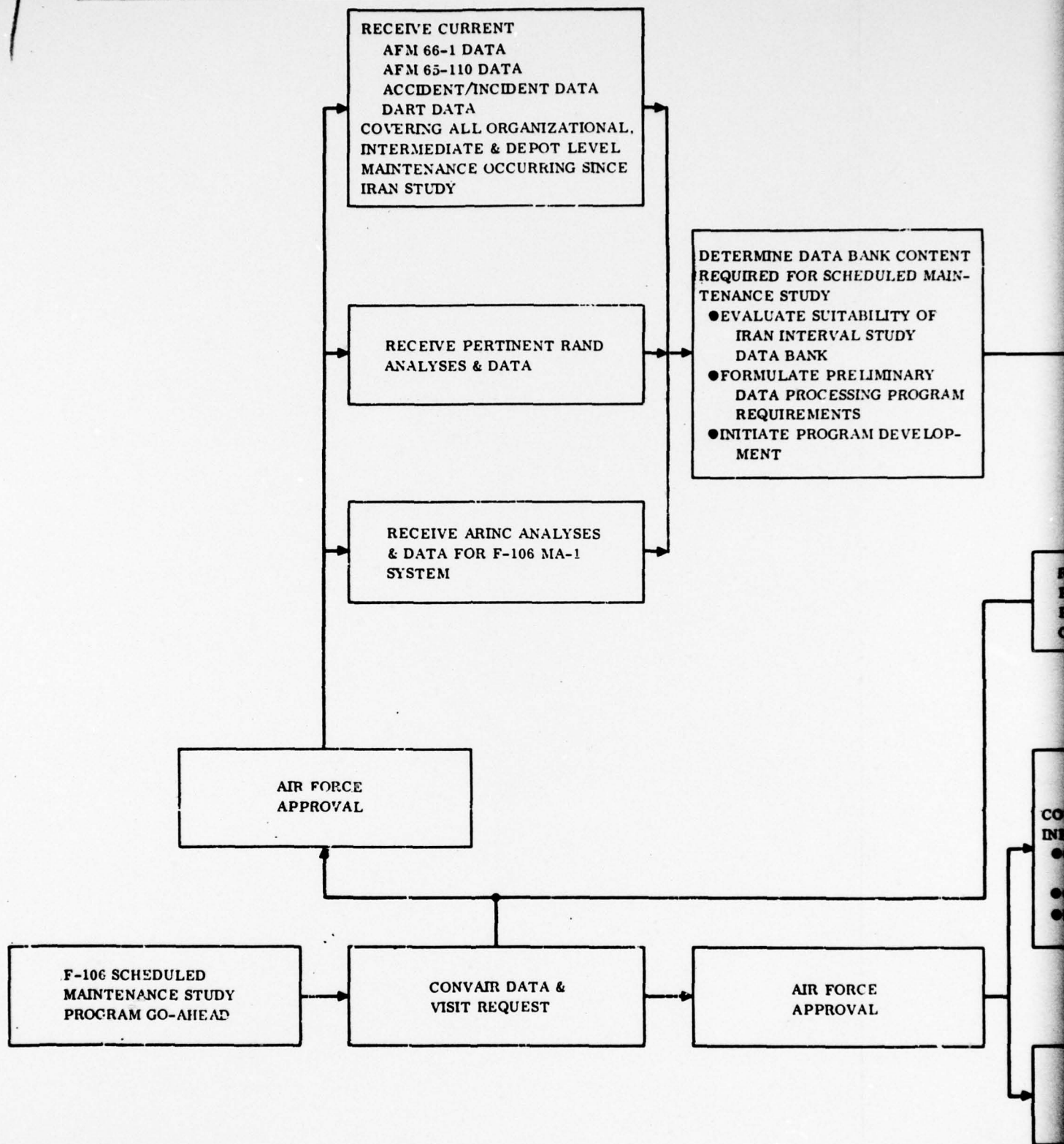
Study tasks, illustrated in Figure 1-1, included review of existing data, generation of a data bank, formulation and application of statistical tests, development and application of a maintenance program analysis procedure, formulation and application of cost and effectiveness models, recommendation of a new maintenance program, and formulation of a transition strategy.

→ Data review, data bank generation, field trips, and problem formulation were accomplished in Phase I of the study, as reported in GDCA-AHD72-001.

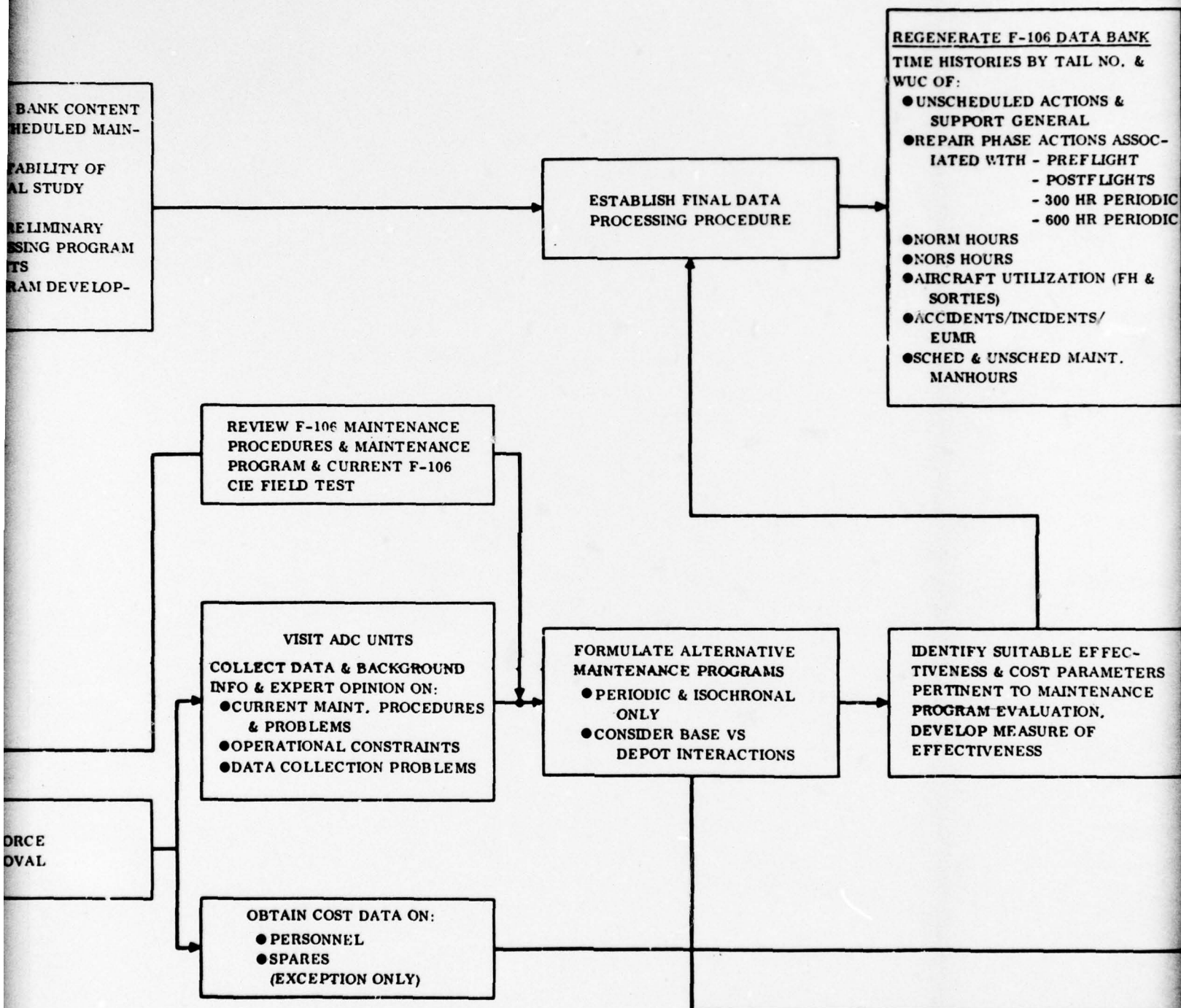
During Phase II of this study, as reported in GDCA-AHD72-003, the required statistical analyses were programmed and performed; the maintenance program analysis process was formulated; the cost and effectiveness models were formulated, programmed, and exercised; and a preliminary definition of the alternative maintenance program was completed.

This report documents the results of the third and final phase of the study as well as Phases I and II. The tasks included in Phase III were the definition of the alternative maintenance program inspection packages and interval constraints, optimization of the maintenance program interval through cost and effectiveness analysis, formulation of a transition strategy for the recommended maintenance program, and preparation of a user's manual for the software package developed during the study.

Total program task flow is shown in Figure 1-1. ↑



2 1
PHASE I DATA GATHERING



3

DATE F-106 DATA BANK
ORIES BY TAIL NO. &
EDULED ACTIONS &
ORT GENERAL
PHASE ACTIONS ASSOC-
D WITH - PREFLIGHT
- POSTFLIGHTS
- 300 HR PERIODIC
- 600 HR PERIODIC
HOURS
HOURS
AFT UTILIZATION (FH &
IES)
ENTS/INCIDENTS/
R
& UNSCHED MAINT.
HOURS

IFY SUITABLE EFFEC-
ESS & COST PARAMETERS
NENT TO MAINTENANCE
AM EVALUATION.
OP MEASURE OF
CTIVENESS

FORMULATE MAINTENANCE
PROGRAM EVALUATION
APPROACH

PREPARE & SUBMIT
INTERIM REPORT FOR
PHASE I

SELECT STATISTICAL ANALYSES
& TESTS TO BE PERFORMED

MODIFY STATISTICAL
PROGRAMS (CF. IRAN
STUDY) TO PERFORM
ANALYSES & TESTS

COMPUTE MAINTENANCE
ACTION FREQUENCIES FOR
SELECTED WUCS, TASKS, &
ACTIONS

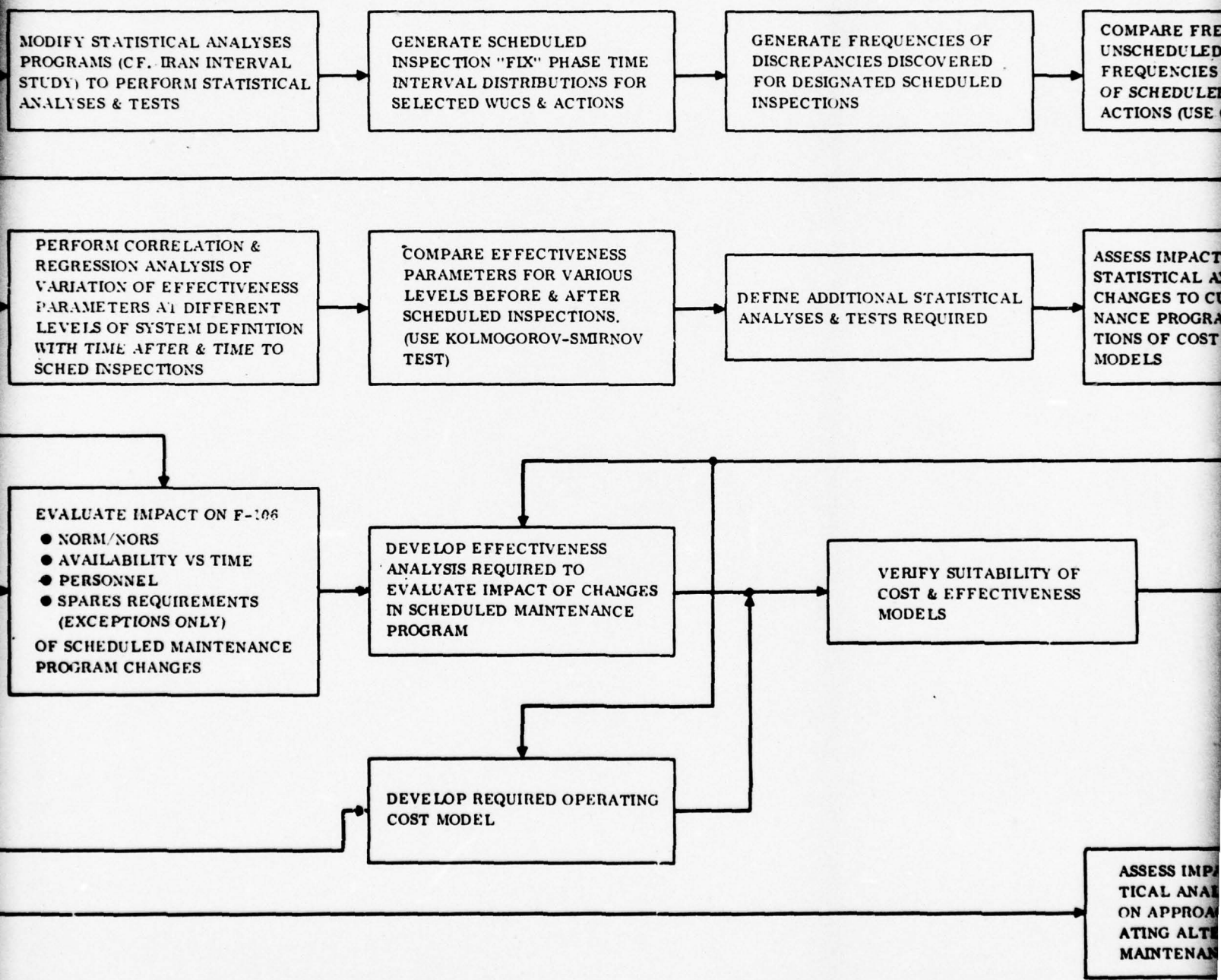
PERFORM CORREL
REGRESSION ANALY
VARIATION OF EFF
PARAMETERS AT D
LEVELS OF SYSTEM
WITH TIME AFTER
SCHED INSPECTION

DEVELOP SUPPORTING
ANALYTICAL MODELS &
ADAPT EXISTING MODELS
WHERE APPLICABLE

EVALUATE IMPACT
● NORM/NORS
● AVAILABILITY V
● PERSONNEL
● SPARES REQUIRE
(EXCEPTIONS OF
OF SCHEDULED MA
PROGRAM CHANGE

PHASE II ANALYSIS

4



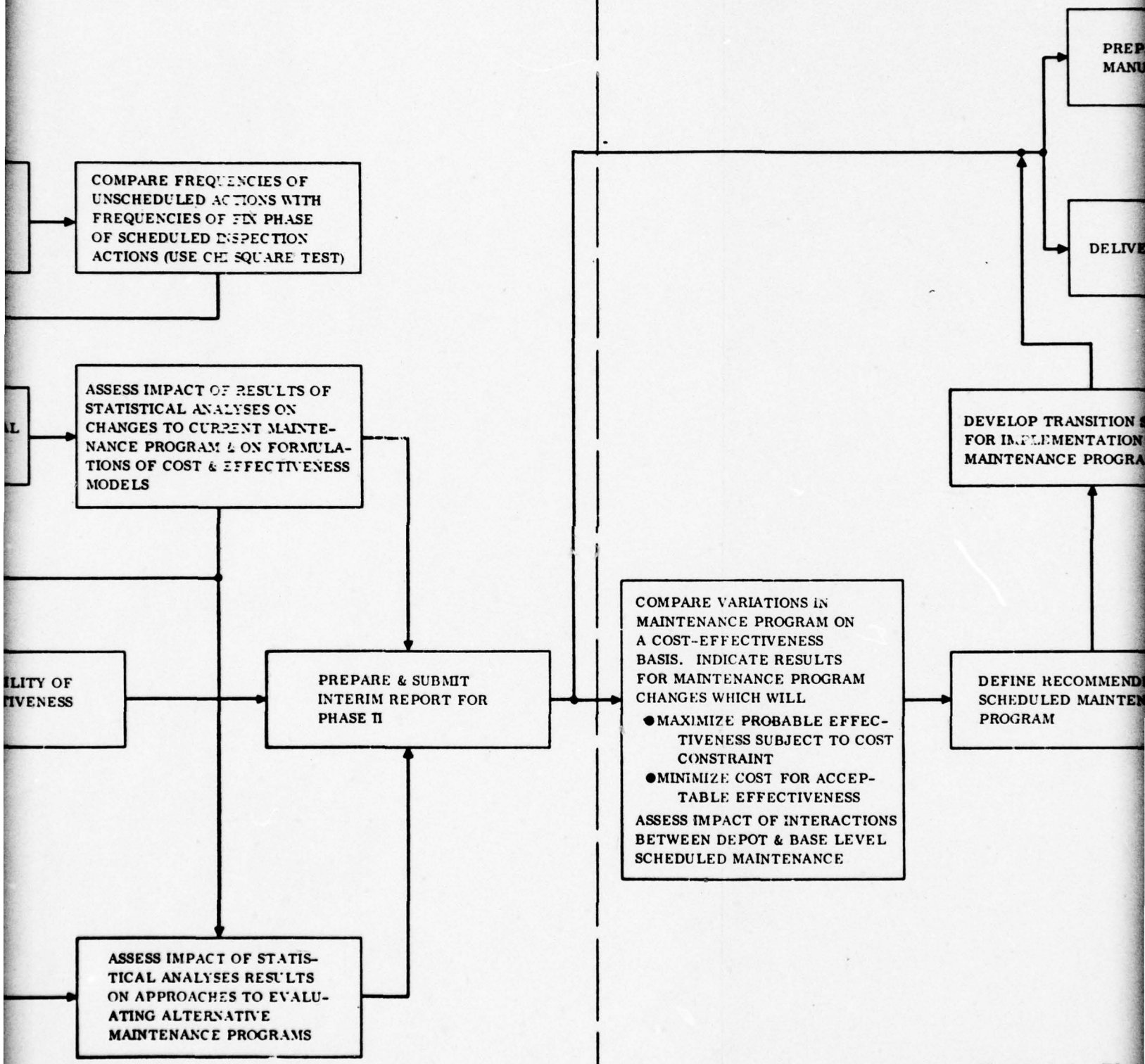


Figure 1-1. Plan

6

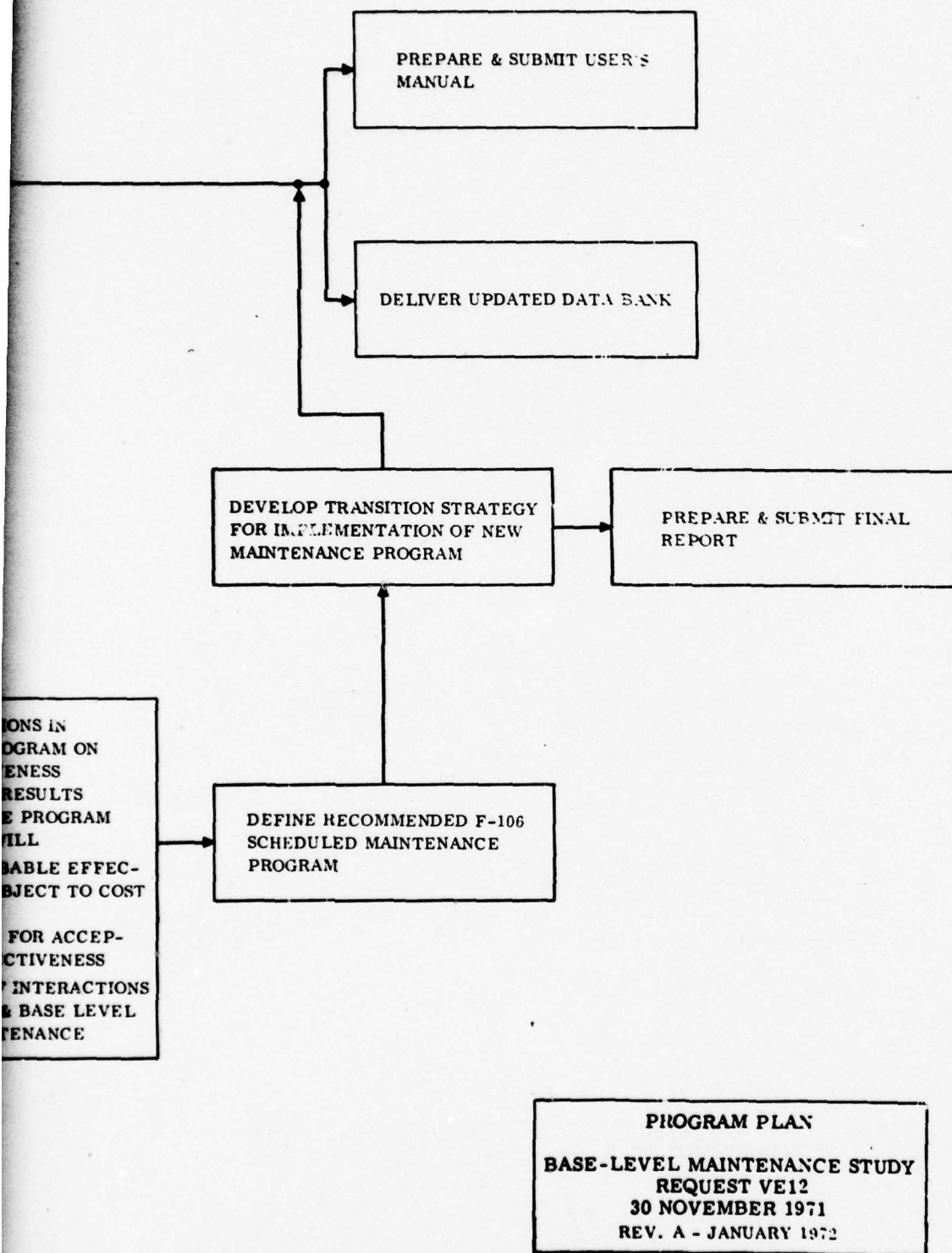


Figure 1-1. Planned Program Flow

SECTION 2

STUDY METHODOLOGY

This section contains a complete description of the study methodology utilized to determine the improved F-106 Scheduled Maintenance Program. The methodology includes a definition of the required data bank, the statistical analyses, the effectiveness model, the recommended maintenance program definition and the economic analysis.

2.1 DEFINITION OF THE DATA BANK

The data bank defined for the F-106 scheduled maintenance study is the result of a thorough study of the specifications of current maintenance procedures, the findings of the preliminary statistical analysis, and the requirements imposed by the statistical tests and analyses anticipated for the study. The data bank contains data obtained from AFM66-1, AFM65-110, Accident/Incident/EUMR tapes, and IRAN visit data.

In general, the lengths of the time intervals in which various parameters should be accumulated depend on the type of inspections involved and the kinds of statistical tests. In the case of the longer inspection intervals, such as those between the third Hourly Postflight Inspection and the 300 FH Periodic Inspections, accumulation within monthly intervals of maintenance action frequencies, NORM hours, manhours, etc., for the associated work unit codes would be adequate. To study the impact of those inspections performed more frequently, such as the preflight and basic postflight inspections, a much shorter interval might be desired since these inspections may be performed daily. Short time intervals would result in a large number of data files and very high computer costs. It was decided that data accumulation within weekly intervals was adequate.

Weekly work unit code maintenance activity is described in the bank in terms of the numbers of maintenance actions with different "when discovered" codes and different "how malfunction" codes. In this way maintenance activity can be related to scheduled inspections. In addition, the unscheduled and scheduled maintenance manhours and NORM hours and the total NORS hours charged to the work unit code (WUC) during the week are included.

Scheduled inspection (03xxx WUC) and special inspection (04xxx WUC) activity during the week is recorded in terms of frequencies, manhours, NORM hours, and NORS hours. Aircraft-level data includes IRAN visit dates, weekly flying hours, sorties, landings, and accidents-incidents-EUMR totals.

Four types of "logical records" are required to describe the data in the bank. Record Type 1 contains the weekly utilization data for the aircraft. Record Type 2 is used

when an aircraft is in IRAN. Record Type 3 contains support general maintenance data including manhours, NORM hours, and NORS hours. Record Type 4 is used for non-support general maintenance and contains the week number, the WUC, unscheduled manhours, scheduled manhours, four fields for when discovered codes, scheduled and unscheduled NORM hours, NORS hours, and four fields for how malfunctioned codes. All type 03xxx and 04xxx support general WUCs are included.

The general procedure for generating the bank was basically similar to that used during the IRAN Study. The new 66-1 and 65-110 raw data tapes were screened and sorted and duplicate records eliminated and then merged with the 66-1 and 65-110 files generated in this manner during the IRAN study. The next processing step was the generation of the data bank records previously described. These operations are shown schematically in Figures 2-1 and 2-2.

Because of the high cost of computer time, it was desirable to omit some of the F-106 equipment identification WUCs from the data bank.

The statistical tests require data for two types of components for aircraft systems other than the engine:

- a. Those components inspected during the scheduled inspections defined in T.O. 1F-106A-6.
- b. Any additional components receiving significant amounts of unscheduled maintenance.

A list of the work unit codes involved in the scheduled inspections was compiled by examining thoroughly each inspection task in T.O. 1F-106A-6. For each task, the applicable WUCs were determined from T.O. 1F-106A-06. This T.O. was also used to determine the how malfunctioned codes that might be used to identify malfunctions discovered during the performance of the task. When necessary, additional technical manuals were consulted to ensure that the inspection task was clearly understood. Examples of the results are given below, with work card and paragraph numbers as given in T.O. 1F-106A-6.

- a. For the third hourly postflight: card 3-001, paragraph 13.

Task — Speed brake actuators, selector valve, lines, hoses, tubing, and connectors for leakage, chafing, and security.

Work Unit Codes: 14JC1 — valve, control hydraulic
14JF1 — actuator, hydraulic
14JQ1 — hose, actuator
14JR1 — hose, emergency extend

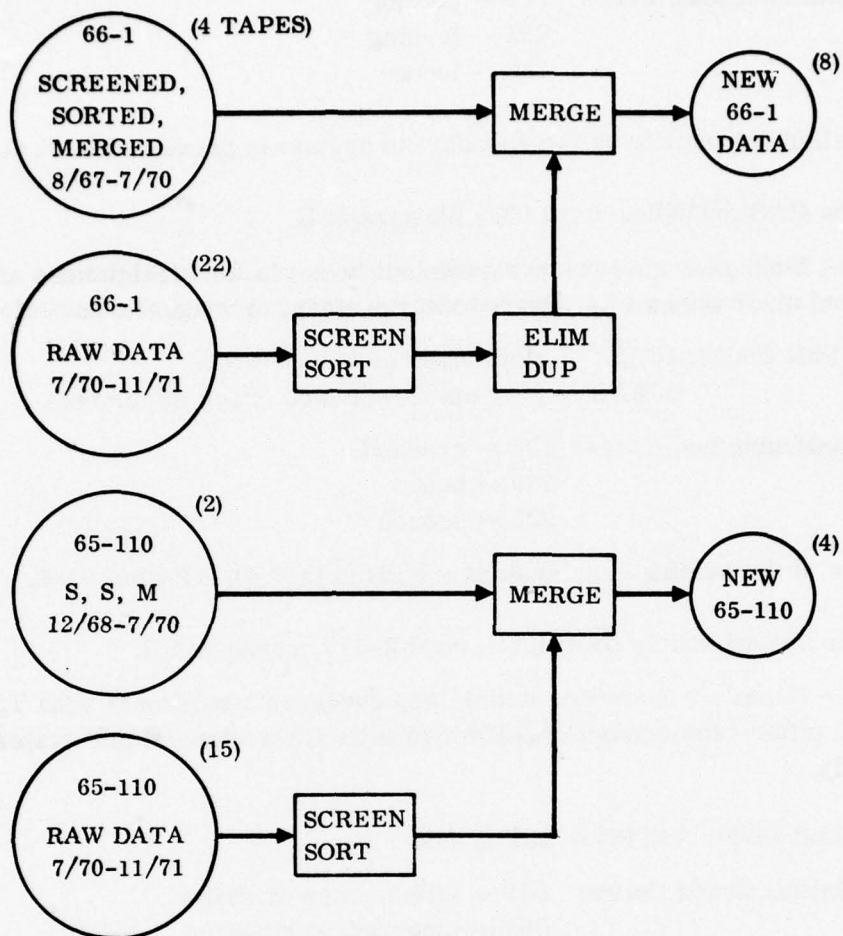


Figure 2-1. Data Screening, Sorting, and Merging

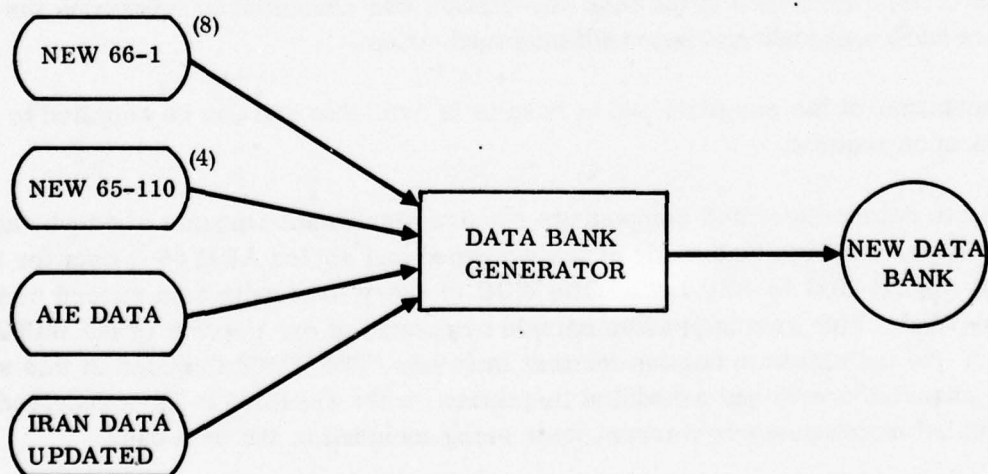


Figure 2-2. Data Bank Generation

How Malfunctioned Codes: 020 — chafing
381 — leaking
730 — loose

A detailed description of the speedbrake system is presented in T.O. 1F-106A-2-7.

- b. For the first periodic: card 033, paragraph 1.

Task — Main gear side brace attachment boss pin for straightness and scoring, pins and studs for cracks (flourescent penetrant or magnetic particle method).

Work Unit Codes: 13AAJ — stud, main gear side brace
13AAK — pin, main gear side brace attachment

How Malfunctioned Codes: 190 — cracked
780 — bent
935 — scored

Details of the landing gear system are given in T.O. 1F-106A-2-8.

- c. For the second hourly postflight: card 2-015, paragraph 1.

Task — Missile transmitter tuning loop checks in accordance with T.O. 1F-106A-2-27-2 (after replacement of RTM hydraulic filter element and system bled and purged).

Work Unit Code: 74APC — tuning unit

How Malfunctioned Codes: 051 — fails to tune or drifts
064 — incorrect modulation
127 — adjustment or alignment improper
748 — frequency erratic or incorrect

The T.O. referenced in the task description was consulted to determine the correct work unit code and how malfunctioned codes.

Documentation of the complete set of results is available and can be supplied to SAAMA upon request.

In order to determine which components receive significant amounts of unscheduled maintenance, a survey was made of the screened and sorted AFM 66-1 data for the interval August 1967 to July 1970. The WUC in every hundredth data record was read and recorded. This gave a random sample composed of one percent of the WUCs included in the maintenance actions for that interval. The WUCs included in this sample, but not associated with any scheduled inspection, were assumed to have received enough unscheduled maintenance to warrant their being included in the data bank.

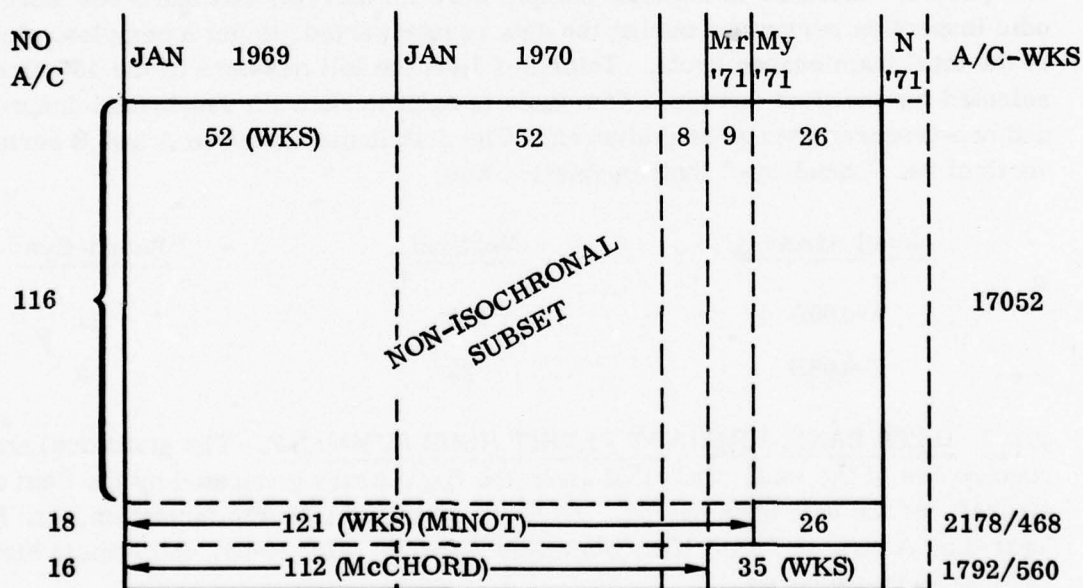
Since the jet engine was to receive only a brief examination during this study, and since only on-aircraft maintenance actions were involved, the engine was not included in the determination of work unit codes involved in the scheduled inspections. All engine work unit codes encountered in the AFM 66-1 data during the processing stage were included in the data bank.

A list of all the equipment identification codes included in the data bank is included on Appendix VI.

2.2 DATA BANK COVERAGE

The data sample included in the F-106 Data Bank is represented schematically in Figure 2-3. The time period spanned is 34 months, from January 1969 to the end of October 1971. This is the period for which AFM65-110 data was available. Time is represented by the horizontal axis in the diagram. There are a total of 150 aircraft in the bank, selected by a stratified sampling approach in which F-106A's and F-106B's are proportionally represented. In addition, isochronal and non-isochronal aircraft as well as each F-106 squadron are proportionally represented. The number of aircraft is represented by the vertical axis.

As shown, 116 aircraft are at non-isochronal bases. The isochronal subset is represented by 18 aircraft at Minot and 16 aircraft at McChord. The isochronal program began at Minot in May 1971 and at McChord March 1971, for data bank time periods of 26 and 35 weeks, respectively. This results in 468 and 560 aircraft-weeks or a



TOTAL ISOCHRONAL A/C-WKS = 1028
 TOTAL NONISOCHRONAL A/C-WKS = 21022

Figure 2-3. Data Bank Coverage

total of 1028 aircraft-weeks of isochronal aircraft experience in the data bank. For the non-isochronal subset, there are 17,052 aircraft-weeks at non-isochronal bases, 2178 non-isochronal aircraft-weeks at Minot, and 1792 non-isochronal aircraft-weeks at McChord, for a total of 21,022 aircraft-weeks of non-isochronal experience in the bank.

2.2.1 FLEET SAMPLE AIRCRAFT RATIONALE. Early in Phase I of the study program, it was evident that processing of maintenance data on the total F-106 fleet would be a waste of program dollars in that redundant data would be reviewed and processed with unnecessary program summaries provided. During the Phase I customer review, agreements were reached to establish a fleet sample size of 150 aircraft to support the study computer programs. Additional sample requirements were to include all aircraft currently in the isochronal inspection test program and equal samples from the other fleet bases. Sample aircraft were to include both "A" and "B" series aircraft and a proportion of both vertical and "round-eye" instrumented aircraft.

To eliminate data that was unusable for any of several reasons, it was necessary to exclude from the fleet sample all aircraft that were not maintained in the operational environment, i.e., those bailed to other government agencies. Also excluded were those aircraft not configured to the fleet aircraft baseline or no longer retained in fleet inventory, i.e., old wing, crashed, etc. Of those aircraft remaining, history records were reviewed to determine those fleet aircraft whose depot IRAN visits gave full maintenance-cycle intervals for the period of data review, as illustrated in Figure 2-3, and to eliminate fleet aircraft that were not fully operational during this period. Included in the fleet sample were all aircraft that had a 600-hour periodic inspection performed during the data review period, to get a complete picture of the total maintenance cycle. Table 2-1 lists the tail numbers of the 150 aircraft selected for the fleet sample. This table is split to show the isochronal-inspected and non-isochronal-inspected aircraft. The distribution between A and B series and vertical vs. "round-eye" instrumentation was:

<u>Model Aircraft</u>	<u>Vertical</u>	<u>"Round-Eye"</u>
F-106A	102	21
F-106B	22	5

2.2.2 DATA BANK AIRCRAFT FLIGHT HOUR SUMMARY. The statistical analyses require use of the total number of airframe flight hours generated by the fleet sample aircraft for the data bank period. To obtain this flight-hour information, Air Force Year-End Airframe Flight Hour Summary Reports, ADC K-63, and vehicle history records were reviewed.

The fleet sample aircraft generated a total of 114,884 flight hours for the three-year period from 31 December 1968 to 31 December 1971. This amount of flying time

Table 2-1. Fleet Sample Aircraft

Series	Tail Number	Series	Tail Number	Series	Tail Number
ISOCHRONAL					
F-106A	57-0236	F-106A	59-0012	F-106A	59-0105
F-106A	57-0237	F-106A	59-0015	F-106A	59-0108
F-106A	57-0243	F-106A	59-0018	F-106A	59-0110
F-106A	57-0244	F-106A	59-0019	F-106A	59-0119
F-106B	57-2545	F-106A	59-0026	F-106A	59-0141
F-106A	58-0776	F-106A	59-0030	F-106A	59-0143
F-106B	58-0901	F-106A	59-0054	F-106A	59-0144
F-106A	59-0002	F-106A	59-0057	F-106A	59-0145
F-106A	59-0003	F-106A	59-0058	F-106A	59-0147
F-106A	59-0005	F-106A	59-0059	F-106B	59-0151
F-106A	59-0006	F-106A	59-0104	F-106B	59-0152
F-106A	59-0010				
NON-ISOCHRONAL					
F-106A	57-0231	F-106A	57-2505	F-106A	58-0780
F-106A	57-0232	F-106B	57-2508	F-106A	58-0781
F-106A	57-0235	F-106B	57-2509	F-106A	58-0783
F-106A	57-2455	F-106B	57-2515	F-106A	58-0785
F-106A	57-2456	F-106B	57-2517	F-106A	58-0786
F-106A	57-2458	F-106B	57-2520	F-106A	58-0788
F-106A	57-2459	F-106B	57-2524	F-106A	58-0792
F-106A	57-2463	F-106B	57-2527	F-106A	58-0797
F-106A	57-2470	F-106B	57-2528	F-106B	58-0900
F-106A	57-2473	F-106B	57-2532	F-106B	58-0903
F-106A	57-2476	F-106B	57-2533	F-106B	58-0904
F-106A	57-2477	F-106B	57-2537	F-106A	59-0004
F-106A	57-2482	F-106B	57-2538	F-106A	59-0007
F-106A	57-2483	F-106B	57-2540	F-106A	59-0008
F-106A	57-2485	F-106B	57-2543	F-106A	59-0016
F-106A	57-2486	F-106B	57-2546	F-106A	59-0024
F-106A	57-2490	F-106A	58-0760	F-106A	59-0025
F-106A	57-2491	F-106A	58-0766	F-106A	59-0027
F-106A	57-2493	F-106A	58-0767	F-106A	59-0028
F-106A	57-2494	F-106A	58-0772	F-106A	59-0031
F-106A	57-2496	F-106A	58-0773	F-106A	59-0033
F-106A	57-2503	F-106A	58-0777	F-106A	59-0035
F-106A	57-2504	F-106A	58-0778	F-106A	59-0043

Table 2-1. Fleet Sample Aircraft (Continued)

Series	Tail Number	Series	Tail Number	Series	Tail Number
NON-ISOCHRONAL (Continued)					
F-106A	59-0044	F-106A	59-0078	F-106A	59-0126
F-106A	59-0046	F-106A	59-0080	F-106A	59-0127
F-106A	59-0048	F-106A	59-0082	F-106A	59-0128
F-106A	59-0051	F-106A	59-0084	F-106A	59-0130
F-106A	59-0052	F-106A	59-0085	F-106A	59-0132
F-106A	59-0053	F-106A	59-0088	F-106A	59-0133
F-106A	59-0056	F-106A	59-0090	F-106A	59-0137
F-106A	59-0060	F-106A	59-0092	F-106A	59-0138
F-106A	59-0063	F-106A	59-0094	F-106A	59-0140
F-106A	59-0064	F-106A	59-0095	F-106A	59-0146
F-106A	59-0065	F-106A	59-0096	F-106B	59-0149
F-106A	59-0067	F-106A	59-0099	F-106B	59-0153
F-106A	59-0069	F-106A	59-0103	F-106B	59-0155
F-106A	59-0072	F-106A	59-0109	F-106B	59-0157
F-106A	59-0074	F-106A	59-0115	F-106B	59-0164
F-106A	59-0076	F-106A	59-0116		

amounts to approximately 21.3 flight hours per aircraft per month. Since the period of data bank history is 34 months (31 December 1968 to 31 October 1971), a two-month average (6390 flight hours) was subtracted from the three-year-period total, resulting in 108,494 flight hours for analysis programs. Table 2-2 documents the detailed flight-hour summary information for the data bank aircraft.

The isochronal inspection test program for F-106 aircraft was started during CY 1971 (at McChord AFB in March and at Minot AFB in May). These aircraft accounted for slightly over 4.8 percent of the flight-hour total, or 5244 hours.

2.2.3 SYSTEM 74 WORK UNIT CODE CONVERSIONS. Analysis of maintenance data reviewed during this study showed a problem with data collected for the fire control system, System 74. Detailed checking revealed that in 1970 the Air Force revised some System 74 WUC callouts, which resulted in some maintenance data being collected against one work unit code prior to 1970 and against another after that time. To get complete accounting of System 74 data for the data bank period, a program conversion was necessary.

Table 2-3 presents the WUC conversions found necessary to align the fire control system for the data bank period. If the table column labeled "Prior to May 70" contains a blank, the data for the adjacent WUC in the "After April 70" column is used for the complete data bank time period. If the column contains an "X", only the adjacent WUC

Table 2-2. Data Bank Aircraft Flight-Hour Summary

Aircraft Tail No.	Flt Hr @ 31 Dec 71	Flt Hr @ 31 Dec 68	Flt Hr During Period
57-0231	2788	2002	786
57-0232	2521	1732	789
57-0235	2532	1708	824
57-0236	2762	2027	735
57-0237	2741	1809	932
57-0243	2683	1914	769
57-0244	2821	2101	720
57-2455	2394	1729	665
57-2456	2726	1987	739
57-2458	2703	1927	776
57-2459	2558	1776	782
57-2463	2862	2136	726
57-2470	2595	1986	609
57-2473	2673	2006	667
57-2476	2635	2059	576
57-2477	2606	1922	684
57-2482	3020	2275	745
57-2483	2930	2215	715
57-2485	2978	2229	749
57-2486	3403	2549	854
57-2490	2777	2014	763
57-2491	2568	1784	784
57-2493	2764	1937	827
57-2494	2756	2114	642
57-2496	2547	2121	426
57-2503	2577	1855	722
57-2504	2695	2073	622
57-2505	2781	2026	755
57-2508	2586	1710	876*
57-2509	2895	2052	843
57-2515	2729	1855	874
57-2517	2107	1500	607
57-2520	2437	1874	563
57-2524	2685	1872	813
57-2527	2427	1887	540*
57-2528	1935	1314	621*
57-2532	2612	1760	852*

*History Record Estimate

Table 2-2. Data Bank Aircraft Flight-Hour Summary (Continued)

Aircraft Tail No.	Flt Hr @ 31 Dec 71	Flt Hr @ 31 Dec 68	Flt Hr During Period
57-2533	2491	1585	906
57-2537	2176	1300	876*
57-2538	2552	1689	863*
57-2540	2661	1765	896*
57-2543	2668	1783	885*
57-2545	3256	2309	947
57-2546	2659	1804	855*
58-0760	2836	1876	960
58-0766	2592	1778	814
58-0767	2696	1811	885
58-0772	2911	1989	922
58-0773	2859	1979	880
58-0776	2351	1515	836*
58-0777	2327	1634	693
58-0778	1774	1340	434*
58-0780	2511	1741	770
58-0751	2444	1619	825
58-0783	2353	1480	873
58-0785	2108	1426	682
58-0786	2325	1539	786
58-0788	2423	1670	753
58-0792	2876	2080	796*
58-0797	2766	1921	845
58-0900	2507	1676	831*
58-0901	3063	2382	681
58-0903	2749	1840	909*
58-0904	2635	1760	875*
59-0002	2726	1947	779
59-0003	3041	2306	735
59-0004	3159	2034	1125*
59-0005	2984	2218	766
59-0006	2628	1821	807
59-0007	2770	1997	773
59-0008	2561	1908	653
59-0010	2915	2052	863

*History Record Estimate

Table 2-2. Data Bank Aircraft Flight-Hour Summary (Continued)

Aircraft Tail No.	Flt Hr @ 31 Dec 71	Flt Hr @ 31 Dec 68	Flt Hr During Period
59-0012	3040	2177	863
59-0015	2776	2091	685
59-0016	2932	2059	873
59-0018	2942	2098	844
59-0019	2916	2284	632
59-0024	2641	1854	787
59-0025	2728	1873	855
59-0026	2222	1457	765
59-0027	2926	1985	941
59-0028	2597	1973	624
59-0030	2942	2188	754
59-0031	2741	1875	866
59-0033	2707	1896	811
59-0035	2966	2138	828
59-0043	2315	1616	699
59-0044	2431	1628	803
59-0046	2343	1572	771
59-0048	2563	1825	738
59-0051	2868	2087	781
59-0052	2705	2022	683
59-0053	2887	2030	857
59-0054	2680	1977	703
59-0056	2746	1980	766
59-0057	2826	2101	725
59-0058	2849	2180	669
59-0059	3008	2286	722
59-0060	2873	2110	763
59-0063	2502	1842	660
59-0064	2344	1537	807
59-0065	2921	2156	765
59-0067	2533	1910	623
59-0069	2421	1740	681
59-0072	2463	1832	631
59-0074	2584	1856	728
59-0076	2738	2006	732
59-0078	2871	2024	847
59-0080	2775	2031	744
59-0082	2607	1910	697
59-0084	2741	2056	685

Table 2-2. Data Bank Aircraft Flight-Hour Summary (Continued)

Aircraft Tail No.	Flt Hr @ 31 Dec 71	Flt Hr @ 31 Dec 68	Flt Hr During Period
59-0085	2741	2037	704
59-0088	3029	2257	772
59-0090	2774	1867	907
59-0092	2915	2031	884
59-0094	2909	2050	859
59-0095	2856	2016	840
59-0096	2659	1902	757
59-0099	2852	2016	836
59-0103	2594	1860	734
59-0104	2173	1495	678*
59-0105	2946	2188	758
59-0108	2912	2198	714
59-0109	2949	2109	840
59-0110	2826	2127	699
59-0115	2464	1851	613
59-0116	2640	1953	687
59-0119	2929	2193	736
59-0126	2545	1873	672
59-0127	2884	2048	836
59-0128	2639	1869	770
59-0130	3003	2203	800
59-0132	2702	2035	667
59-0133	2566	1786	780
59-0137	2673	2010	663
59-0138	3077	2315	762
59-0140	2767	1992	775
59-0141	2886	2098	788
59-0143	2931	2150	781*
59-0144	2910	2108	802
59-0145	3072	2254	818
59-0146	2880	2199	681
59-0147	2753	1984	769
59-0149	2541	1722	819
59-0151	3134	2198	936
59-0152	2796	2160	636
59-0153	2876	1937	939
59-0155	2546	1814	732
59-0157	2663	1835	828
59-0164	2353	1900	453*

*History Record Estimate

Table 2-2. Data Bank Aircraft Flight-Hour Summary (Continued)

Summary

Total three-year flight hour summary = 114,884 flight hours.

Average per month per aircraft = 21.3 flight hours.

Two-month average = 6,390 flight hours.

Data bank base = 108,494 flight hours.

data available for May 1970 and subsequent was used. If a WUC is listed in the "Prior to May 70" column, all data available prior to 1 May 1970 for this WUC was accumulated and treated as data for the adjacent WUC listed in the "After April 70" column. Note that in all cases only the WUCs in the "After April 70" column were used to describe any data printouts.

Table 2-3. Work Unit Code Conversions for System 74

Prior to May 70	After *April 70	Prior to May 70	After *April 70	Prior to May 70	After *April 70
	74000		74ADK		74AED
	74A00		74ADL		74AEE
	74AA1		74ADM	x	74AEF
	74AB1		74ADN		74AEG
	74AC1		74ADP	x	74AEH
	74ACA		74ADQ		74AEJ
	74AD1		74ADR		74AEK
	74ADA		74ADS		74AEL
	74ADB		74ADT		74AEM
	74ADC		74ADW		74AEN
	74ADD		74ADX		74AEP
	74ADE		74ADY		74AEQ
	74ADF		74ADZ		74AER
	74ADG		74AEA		74AES
	74ADH		74AEB		74AF1
	74ADJ		74AEC		74AG1

x - Use only data after April 1970 (P/N Change)

* - Print only these numbers

Table 2-3. Work Unit Code Conversions for System 74 (Continued)

Prior to May 70	After *April 70	Prior to May 70	After *April 70	Prior to May 70	After *April 70
	74AGA	74AP1	74AQ1		74BAB
	74AGB	74AQ1	74AR1		74BAC
x	74AJ1	74AQB	74ARB		74BAD
74AJ1	74AK1	74AQC	74ARC		74BAE
74AK1	74AL1		74ARD	74BC1	74BB1
74AKA	74ALA		74ARE	74BCA	74BBA
74AM1	74AN1		74ARF	74BD1	74BC1
74AN1	74AP1		74ARG	x	74BCA
74ANB	74APA		74ARH		74BCB
74ANC	74APB		74ARJ		74BCC
74AND	74APC		74ARK		74BCD
74ANG	74APF		74ARL		74BCE
74ANH	74APG		74ARM	74BG1	74BD1
74ANJ	74APH		74ARN	74GE1	74BE1
74ANK	74APJ		74ARP	74BH1	74BF1
74ANL	74APK		74ARQ	74BJ1	74BG1
74ANM	74APL		74ARR	74BK1	74BH1
74ANN	74APM		74ARS	74BL1	74BJ1
74APN	74APN		74ART	74BM1	74BK1
74ANQ	74APP		74ARU	74BMA	74BKA
74ANS	74APR		74ARV	74BMB	74BKB
74ANT	74APS		74ARW	74BN1	74BL1
74ANU	74APT		74ARX	74BP1	74BM1
74ANV	74APU	74AR1	74AS1	74BPA	74BMA
74ANW	74APV	74AS1	74AT1	74BPB	74BMB
74ANX	74APW	74ASA	74ATA	74BQ1	74BN1
74ANY	74APX		74ATB		74BNA
74ANZ	74APY		74ATC	74BR1	74BP1
74AN2	74APZ	74AT1	74AU1	74BT1	74BQ1
74AN3	74AP2		74AV1	74BU1	74BR1
74AN4	74AP3		74AW1	74BUA	74BRA
74AN5	74AP4		74AX1	74BUB	74BRB
74AN6	74AP5		74AY1	74BV1	74BS1
74AN7	74AP6		74AZ1	74BW1	74BT1
74AN8	74AP7		74BA1	74BX1	74BU1
	74AP8		74BAA	74CM1	74BV1

x - Use only data after April 1970 (P/N Change)

* - Print only these numbers

Table 2-3. Work Unit Code Conversions for System 74 (Continued)

Prior to May 70	After *April 70	Prior to May 70	After *April 70	Prior to May 70	After *April 70
74CN1	74BW1	74CTD	74CJD		74FAV
74BZ1	74BX1	74CTE	74CJE		74FAW
74BZA	74BXA	74CG1	74DB1		74FAX
74CP1	74BY1	74CH1	74DC1		74FAY
74CA1	74BZ1	74CHA	74DCA		74FAZ
74CAA	74BZA	74CHB	74DCB		74FA2
74CQ1	74CA1	74CHC	74DCC		74FA3
74CQA	74CAA	74CHE	74DCD		74FA4
74CQB	74CAB	74CHF	74DCE		74FA5
74CQC	74CAC	74CK1	74DD1		74FA6
74CQD	74CAD	x	74DE1		74FA7
74CQE	74CAE	x	74DF1		74FA8
	74CB1	x	74DG1	74FF1	74FB1
74CR1	74CC1	x	74DZ1	74FE1	74FC1
74CRA	74CCA	74E00	74F00	74FEA	74FCA
74CRB	74CCB	74EB1	74FA0	74FEB	74FCB
74CRC	74CCC		74FA1	74FEC	74FCC
74CRD	74CCD		74FAA	74FED	74FCD
74CRE	74CCE		74FAB	74FEE	74FCE
74CRF	74CCF		74FAC	74FEF	74FCF
74CRG	74CCG		74FAD	74FC1	74FD1
74CRH	74CCH		74FAE	74FCA	74FDA
74CRJ	74CCJ		74FAF	74FCB	74FDB
74CRK	74CCK		74FAG	74FCC	74FDC
74CRL	74CCL		74FAH	74FCD	74FDD
74CC1	74CD1		74FAJ	74FCE	74FDE
74CS1	74CF1		74FAK	74FCF	74FDF
74CSA	74CFA		74FAL	74FCG	74FDG
74CSB	74CFB		74FAM	74FCH	74FDH
74CE1	74CG1		74FAN	74FCJ	74FDJ
74CF1	74CH1		74FAP	74FCK	74FDK
74CFA	74CHA		74FAQ	74FCL	74FDL
74CT1	74CJ1		74FAR	74FCM	74FDM
74CTA	74CJA		74FAS	74FCN	74FDN
74CTB	74CJB		74FAT	74FCP	74FDP
74CTC	74CJC		74FAU	74FCQ	74FDQ

x - Use only data after April 1970 (P/N Change)

* - Print only these numbers

Table 2-3. Work Unit Code Conversions for System 74 (Continued)

Prior to May 70	After *April 70	Prior to May 70	After *April 70	Prior to May 70	After *April 70
74FCR	74FDR	74EU1	74FK1	x	74KCA
74FCS	74FDS		74H00	74KBB	74KCB
74FCT	74FDT		74HA1	74KC1	74KD1
74FCU	74FDU		74HB1	74KD1	74KE1
74FCV	74FDV		74HC1	x	74KEA
74FCW	74FDW		74HD1	74KDB	74KEB
74FCX	74FDX		74HE1	74KDC	74KEC
74FCY	74FDY		74HG1	x	74KED
74FCZ	74FDZ		74HH1	74KE1	74KF1
74FC2	74FD2		74HJ1	74KEB	74KFB
74FC3	74FD3		74HL1	74KF1	74KG1
74FC4	74FD4		74HM1	74KFA	74KGA
74FC5	74FD5		74HP1	74KFB	74KGB
74FC6	74FD6		74HQ1	74KFC	74KGC
74FC7	74FD7		74HR1	74KFD	74KGD
74FC8	74FD8		74HRA	74KFE	74KGE
74FC9	74FD9		74HRB	74KFF	74KGF
74FDA	74FEA		74HRC	74KFG	74KGG
74FBD	74FEB		74HS1	74KFH	74KGH
74FB1	74FF1		74HT1	74KFJ	74KGJ
74FBA	74FFA		74HTA	74KFK	74K GK
74FBB	74FFB		74HTB	74KFL	74KGL
74FBC	74FFC		74HU1		74KGM
74FBD	74FFD		74HV1		74KGN
74FBE	74FFE		74HW1		74KGP
74FBF	74FFF		74HX1		74KGQ
74FBG	74FFG		74HXA	74KG1	74KH1
74FBH	74FFH		74HY1		74KJ1
74FBJ	74FFJ		74HZ1	74KMA	74KJA
74FBK	74FFK		74K00	74KP1	74KK1
74FBL	74FFL		74KA1	74KQ1	74KL1
74FBM	74FFM		74KAA	74KR1	74KM1
	74FFN		74KAB	74KS1	74KN1
74EV1	74FG1		74KAC	74KT1	74KP1
74EW1	74FH1	74KM1	74KB1	74KU1	74KQ1
74EX1	74FJ1	74KB1	74KC1	74CEA	74CGA

x - Use only data after April 1970 (P/N Change)

* - Print only these numbers

Table 2-3. Work Unit Code Conversions for System 74 (Continued)

Prior to May 70	After *April 70	Prior to May 70	After *April 70	Prior to May 70	After *April 70
74KV1	74KR1	74GB1	74PB1	74GK1	74PJ1
	74LA1	74GD1	74PC1	74GL1	74PK1
	74LB1	74BF1	74PD1	74GM1	74PL1
	74LC1	74GF1	74PE1	74GP1	74PM1
	74LE1	74GG1	74PF1	74GQ1	74PN1
	74LG1	74GGA	74PFA	74GR1	74PP1
74G00	74P00	74GH1	74PG1	74GN1	74QA1
74GA1	74PA1	74GJ1	74PH1	74GNA	74QAA

* Print only these numbers

2.3 MAINTENANCE PROGRAM ANALYSIS METHODOLOGY

2.3.1 MAINTENANCE PROGRAM DEFINITION. A systematic analysis and evaluation process for determining maintenance program inspection requirements was developed. The process is represented schematically by the logic diagram in Figure 2-4. In general, the procedure consists of basing requirements for inspection tasks for work unit codes on WUC criticality, failure characteristics, and inspectability. After inspection task requirements are established, the maintenance program inspection package content and the sequence of inspection packages in a maintenance program are determined, consistent with maintenance action interval characteristics and constraints imposed by work areas, accessibility, other maintenance, and task times.

This evaluation process uses the results obtained from the statistical analyses. The various points in the logic diagram where output from the statistical analyses is required are indicated by the Roman numeral of that analysis, as follows:

- ① Maintenance Action Frequency Analysis
- ② Manhour and NOR Hours Distributions
- ③ Scheduled Inspection and Maintenance Action Interval Length Analyses
- ④ Effect of Time After Inspection Analysis
- ⑤ WUC Removal Frequency and Interval Analysis

A step-by-step description of the evaluation process follows.

For each work unit code selected (block 2) it is determined in block 3 if there is a malfunction which is critical to flight safety. The next criterion applied (in block 4) is that

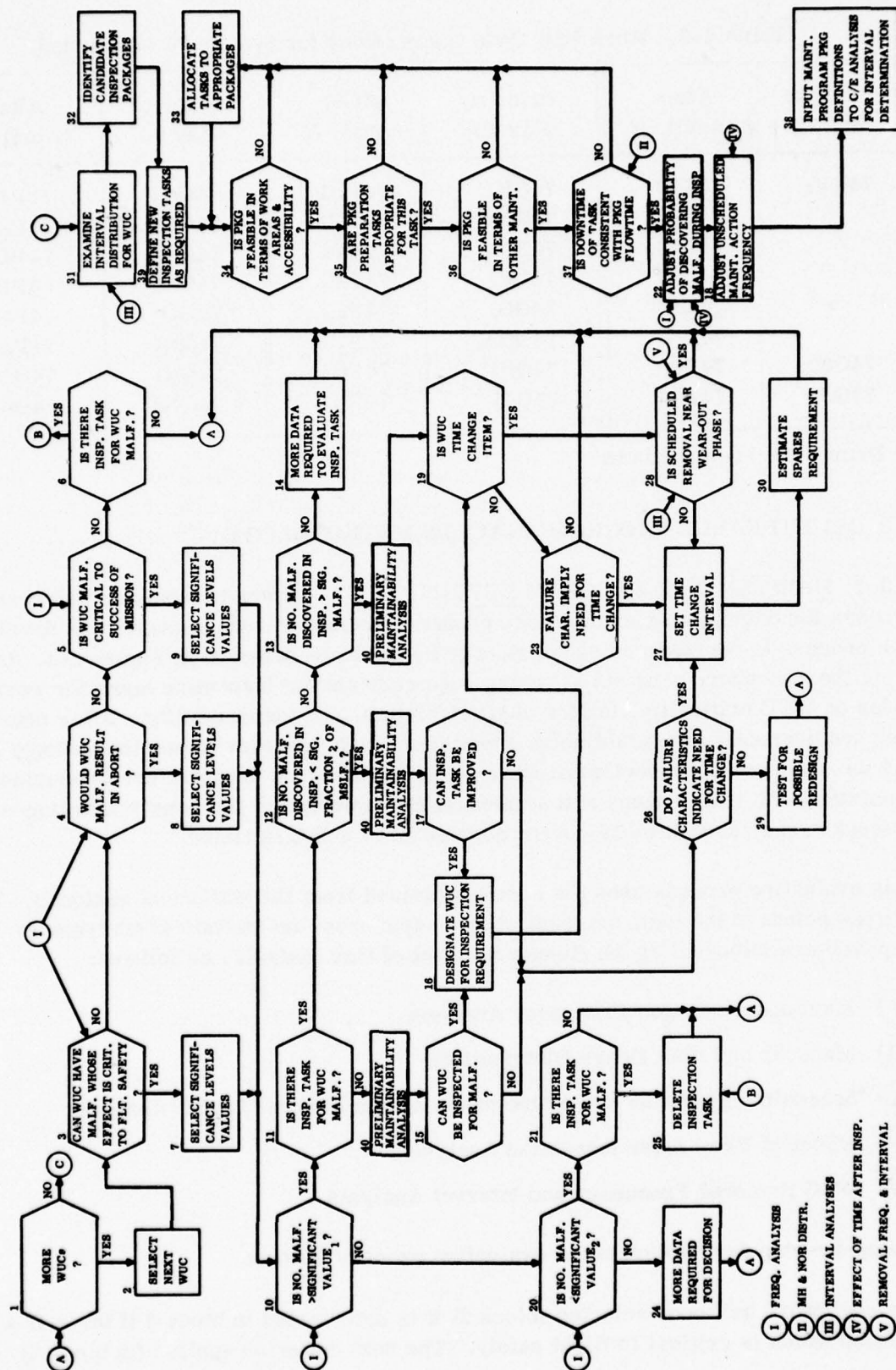


Figure 2-4. Maintenance Program Definition

of flight abort: Does the work unit code have a malfunction which would cause abort of the mission? In block 5, possible degradation of mission capability as a result of a malfunction is considered. If none of these criteria apply, then in block 6 any existing inspection tasks for the work unit code are considered for deletion and the evaluation process continues at point B.

If the work unit code has critical malfunction characteristics, then the number of malfunctions considered significant is determined in blocks 7, 8, or 9. In this study these significance-level values are chosen using engineering judgment, as discussed further on in this section of the report.

There are alternative approaches to determining these values in blocks 7, 8, and 9, which require more detailed analyses of failure modes and effects and the economic impacts of maintainability characteristics.

If the critical failure rate, λ_{crit} , for the work unit code has been established, then statistical hypothesis-testing techniques provide an upper bound on the malfunction frequency which implies that some inspection is required, and a lower bound which implies one is not required.

The following example of this type of analysis is based on the assumption of randomly occurring failures, which in many cases is a reasonable assumption. If failures do not occur randomly, with a non-constant failure rate, a correspondingly more general sampling distribution, such as the Weibull distribution, would replace the Poisson distribution in the following discussion.

To establish the upper bound, we test the hypothesis

H_0 : The system has failure characteristics such that the failure rate is $\leq \lambda_{crit}$; that is, no problem.

This hypothesis is then rejected if the number of malfunctions observed exceeds n_u , where this upper bound is determined by the significance level α , the type I error, and the probability that the number of malfunctions could exceed n_u by chance when the actual failure rate is as low as λ_{crit} . That is, n_u is such that

$$P_r \{n \geq n_u \mid \lambda = \lambda_{crit}\} \leq \alpha.$$

For failures occurring randomly, we have in time T

$$P_r \{n=k \mid \lambda = \lambda_{crit}\} = \frac{(\lambda_{crit} T)^k \exp(-\lambda_{crit} T)}{k!},$$

and n_u must satisfy

$$\sum_{k=n_u}^{\infty} \frac{(\lambda_{\text{crit}} T)^k \exp(-\lambda_{\text{crit}} T)}{k!} \leq \alpha$$

To determine the lower bound, n_l , on the number of malfunctions, we test the hypothesis

H_0 : The system has failure characteristics at least as bad as λ_{crit} ; that is,
 $\lambda \geq \lambda_{\text{crit}}$.

This hypothesis is then rejected if the number of malfunctions observed is less than n_l where the probability of this occurring by chance under the hypothesis is α , the significance level. Hence, the value of n_l is determined by

$$\sum_{k=0}^{n_l} \frac{(\lambda_{\text{crit}} T)^k \exp(-\lambda_{\text{crit}} T)}{k!} = \alpha$$

The above approach places the determination of significant values for the number of malfunctions on a rigorous basis once the critical failure rate, λ_{crit} , has been established. Through a more detailed analysis of failure modes and the effects of failure and the associated costs versus the costs of inspections and maintenance, it is possible to determine critical rates for work unit codes which make inspection tasks economically justified. Such an approach has been under consideration but is beyond the scope of the current study.

At block 10 in the logic diagram, it is determined if there have been a sufficient number of malfunctions to require an inspection. The next step, starting in block 11, is to consider the efficiency of the inspection. If there is an existing inspection task, it is determined whether it discovers a significant fraction of the total malfunctions that occur. In this study, this fraction is set using engineering judgment.

A rigorous determination of upper and lower significance bounds on the fraction of malfunctions discovered is possible by a process similar to that described above. Starting with a critical value p_{rep} for the conditional probability of discovering the malfunction, given that the inspection task is performed, statistical hypothesis testing techniques yield the upper bound, f_u , above which the inspection task is acceptable with only probability α of error, and the lower bound, f_l , below which the task is most probably unacceptable.

The upper bound, f_u , is obtained by testing the hypothesis

H_0 : The inspection task is ineffective, with probability of discovery p_{rep} or less.

If the fraction discovered now exceeds f_u with a probability as low as α by chance, assuming p_{rep} , then H_0 is rejected.

Thus, f_u is established by

$$P_r \{ \text{No. malf disc.} \geq f_u \cdot N | p_{rep} \} = \alpha$$

where N is total number of inspections, or f_u is the solution of

$$\sum_{k=f_u \cdot N}^{\infty} \binom{N}{k} p_{rep}^k (1 - p_{rep})^{N-k} = \alpha,$$

assuming a Bernoulli sequence of independent trials and introducing the binomial distribution.

Conversely, f_l is derived by testing the hypothesis

H_0 : The inspection task is effective, with conditional probability of malfunction discovery at least as good as p_{rep} .

This leads to the following equation for f_l :

$$\sum_{k=0}^{f_l \cdot N} \binom{N}{k} p_{rep}^k (1 - p_{rep})^{N-k} = \alpha.$$

The above analysis is based on a previously chosen value for p_{rep} . This critical value in turn should be the result of a detailed analysis of WUC failure characteristics, inspectability, maintenance costs, and costs of inspection.

If in block 12 it has been determined that an insufficient number of malfunctions is discovered by the existing inspection tasks, a preliminary maintainability analysis is conducted to evaluate the failure characteristics and inspectability of the WUC at block 17. This analysis is used to establish a requirement for a new inspection task or to indicate that the WUC is not an inspectable item. If the item is inspectable, a WUC inspection requirement is established at block 16.

The preliminary maintainability analysis (block 40) consisted of identifying all assemblies associated with a given WUC, checking usage data to determine mean time between maintenance actions and repair times, and researching the items in the F-106 technical

manuals. Use of aerospace ground equipment and high-skill-level personnel were investigated. These data were used to identify the inspectability and in some cases the criticality of the WUCs.

Whether or not it is decided that an inspection is required or an existing task needs improvement, the failure characteristics of the WUC are studied, at blocks 23 and 26, to determine if it is a time-change item. This is accomplished by determining from the maintenance action interval distributions whether the WUC has a wearout phase and if scheduled removals are taking place at consistent intervals at block 28.

If a new scheduled removal frequency is indicated, the old and new frequencies are input to the economic analyses in block 30 to estimate the changes in spares cost and intermediate and depot level labor costs.

If it has been determined at block 10 that an inspection task is required, but it is found at blocks 15 or 17 that inspectability characteristics are such that no improvement in this respect is possible and, furthermore, failure characteristics are such that a time change is not the solution, then consideration is given to possible redesign as a solution at block 29. This test was not applied during the F-106 study.

After this evaluation procedure is completed for a work unit code it is repeated for the next WUC at point A in the logic diagram. Upon completion of this phase of the maintenance program analysis process, the evaluation continues at point C where an appropriate allocation of inspection tasks to inspection packages is determined.

At point C in block 31, all WUCs that have been selected as inspection items based on the analysis are classified according to maintenance interval length. This was accomplished utilizing both the mean time between removals (Task V) and maintenance action interval characteristics from Task III. The WUCs were then subdivided by maintenance interval for further analysis.

Five divisions for mean time between maintenance actions were used initially: 75 flight hours or less, 76 to 150 flight hours, 150 to 800 flight hours, 801 to 1200 flight hours, and 1201 or more flight hours. This was later modified to the following classes: 0 to 150 flight hours, 151 to 800 flight hours, and 801 flight hours or more. These class divisions were found to provide an appropriate subdivision of F-106 scheduled maintenance tasks. The preliminary candidate inspection packages (block 32) were set up utilizing these classes. All items in the 150-hour class fell into the minor inspection; items in the 151 to 800 hour class fell into the major inspection or the engine inspection. Items in the class of 801 hours or more fell into the IRAN package. Examination of the failure characteristics of the WUCs in each class further indicated that the limits on the proposed inspections should be: 75 to 125 flight hours for the minor inspections, 350 to 440 flight hours for the major inspections, and 300 flight hours for the engine inspection, since no interval extension for the engine was evaluated.

Block 39, determination of the feasibility of each package, required that each WUC in each class be associated with an inspection task. This rather extensive task required considerable expert knowledge of the aircraft and engineering judgment. Task I was researched for each WUC to determine the principle malfunctions exhibited by each WUC.

The aircraft technical orders, previous scheduled inspection tasks, and aircraft drawings were researched for further information, as were service engineering reports. These data were utilized to develop a specified inspection for each WUC in each class. After all tasks for each class were assembled a preliminary evaluation was made to determine the feasibility of making these inspections (block 34). It was discovered that many items in the minor inspection were also being inspected at the interval for the major. To avoid duplication, several tasks were shifted from the major to the minor and the ground rule set that a complete minor would be accomplished with each major.

The next step, block 35, was to examine the preparation tasks. The actual task here was to set up the appropriate preparation tasks based on the content of each inspection. This was done by a thorough evaluation of all tasks on the inspection and determination of those preparation items required to accomplish the inspection. The preparation tasks were delineated by maintainability engineers and checked by service engineers experienced on the F-106 aircraft.

Block 36 required an evaluation of the amount of maintenance time spent in various areas of the aircraft, any requirements for unusual skills or special shop support, and other unusual conditions generated by the new inspections. At this time it was determined that the engine inspection should be removed from the major inspection and made a special inspection. The class interval was set at 300 engine operating hours (the current interval) and all items located in the engine compartment were reevaluated to determine whether their failure characteristics were consistent with this interval. The result is the engine inspection identified in Appendix V, which calls for removal of the engine and inspection of airframe items in the engine compartment prior to replacement of the engine.

The final item to be determined was the flow time (essentially aircraft downtime) and man time for each inspection. These are given in Section 3 of this report.

The estimated flow times did not indicate any problems (excessive downtime, etc.) so no further package modifications were required. This completes the package description, including preparation tasks, and interval constraints based on the actual in-service reliability of the weapon system. These data are input into the effectiveness model for final determination of the inspection interval.

2.3.2 MAINTENANCE PROGRAM SELECTION. The previous section describes the overall methodology utilized to arrive at an alternate maintenance program for the F-106. The details involved in the application of that methodology are given below.

First all WUCs in the F-106 Data Bank were subjected to evaluation, following the process set down in Figure 2-5. For ease of discussion the process is broken down into three parts: safety, criticality, and inspectability.

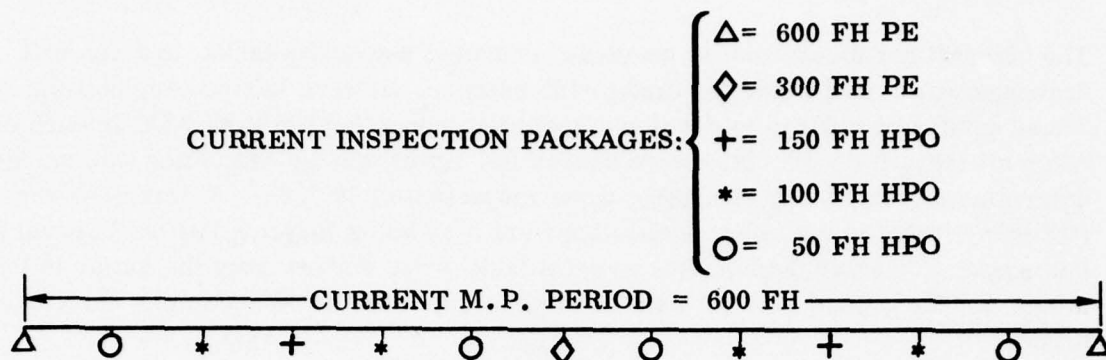


Figure 2-5. Schematic Representation of Maintenance Program

A work sheet was designed which contains the information items listed in Table 2-4. All data were entered for each WUC. The maintenance frequency was computed from the mean values of the maintenance action interval from Task III, while the removal frequency was computed from Task V data. Safety categories were assigned to each WUC subsequent to a preliminary hazard analysis. The next step was to determine the criticality by checking the critical ratios against the number of ground and air aborts. Inspectability of the item (its capability of being inspected) was evaluated in two parts: First, the inspection effectiveness (the number of malfunctions discovered on inspections versus the total number of malfunctions was determined. Second, the preliminary maintainability analysis looked at the access available, the aerospace ground equipment, and the skill levels involved to ensure feasibility of the inspections.

Figure 2-6 is a sample worksheet further illustrating the method for selecting the WUCs to be inspected. The first WUC, 11CBA, is not flight safety or abort critical and inspections of this item were not effective; therefore, the decision was made not to inspect this WUC. The next item, 13DH1, is not considered flight safety or abort critical (although a Category II item). The part could be inspected for the principal failure modes and the inspection was effective (0.174 greater than 0.05); thus, the decision to inspect this part. In addition, this WUC is a time change item (every 12 months) which has been recommended, on the basis of the statistical analyses, for interval extension to 600 flight hours. All items in the time-change category were transferred to other work sheets, along with their respective maintenance action frequencies and removal rates. Inspection interval constraints were then developed as explained in Section 2.7.

The following sections explain the development of the safety and criticality ratios that have been inserted on the worksheets.

Table 2-4. Inspection Determination - Work Sheet Information

Work Unit Code	
Type Inspection	(HPO or PE)
Ground Aborts	(quantity)
Maintenance Action Frequency	(MA/FH calculated)
	$\sum \left(\frac{1}{\text{FH/MA}} \right) \text{TASK III}$
Removal Rate	(Removals/FH calculated)
Safety Classification	(Category I, II or III)
Safety Critical Number of Malfunctions	(from Table 2-2)
Flight Safety Critical	(Yes or No)
Flight Abort Critical Number of Malfunctions	(from Table 2-2)
Flight Abort Critical	(Yes or No)
Inspection Decision	(Yes or No)
Total Number of Malfunctions	(quantity)
Number Malfunctions This Inspection	(quantity)
Malf. This Insp. \div Sum Malf.	(calculated)
Critical Ratio	(from Table 2-2)
Inspection Effectiveness	(Yes or No)
Is WUC Inspectible	(Yes or No)
New Scheduled Removal Frequency (N_N)	(From analysis)
Old Scheduled Removal Frequency (N_O)	(From -6 Handbook)
$N_N - N_O$	(calculated)
Mean Maintenance Action Interval	(quantity)
Std. Deviation of Interval	(quantity)
Candidate Package	
Task Flow Time	
MH/Task	

WUC Selection					Significant Number Malif.				Decision		Effectiveness Of Inspection				Decision		Time Change Items			
WUC	Insp.	Aborts		Maint. Action Freq.	Removal Rate (FH/REM)	Safety Class	Safety Critical No. Malif.	Flight		Flight Abort Critical (Y-N)	Inspect WUC (Y-N)	Total Number Malif.	No. Malif. Discovered In Insp.	Malif. Σ Malif.	Critical Ratio	Is Insp. Eff. (Y-N)	Can WUC Be Insp. for Malif. (Y-N)	Sch Rem Freq. (N _n)	Old Sched REM Freq. (N _o)	N _n - N _o
		Flight	Safety Critical (Y-N)					Flight Abort No. Signif.												
11CBA	HPO PE	0	1	0.1199	129	I	20	N	15	N	N	3689	324	0.088	1/5	N	N			
13DH1	HPO PE	2	0	0.0300	125	II	10	N	5	N	Y	1256 1256	218	0.174	1/20	Y	Y	600 FH	12 Mo.	300 FH
14AA1	HPO PE	5	0	0.0004	6027	III	5	Y	1	N	Y	38	10 1	0.263 0.0263	1/20	Y	Y			
41FA1	HPO PE	1	4	0.0160	519	II	10	N	5	N	Y	278	27 18	0.10 0.067	1/30	Y	Y			
42CD1	HPO PE	34	17	0.0122	635	II	10	Y	5	Y	Y	204	1 12	0.005 0.059	1/30	Y	N (IRAN)			
45AF1	HPO PE	9	5	0.0081	493	II	10	N	5	Y	Y	557	34 59	0.06 0.011	1/30	Y	Y	600 FH	600 FH	0
45BS1	HPO PE	11	2	0.0166	675	II	10	Y	5	N	Y	677	50 116	0.074 0.172	1/30	Y	Y			
71AB1	HPO PE	11	2	0.1285	84	II	10	Y	5	N	Y	2694	65 27	0.024 0.01	1/30	N	N			

Figure 2-6. Sample Worksheet

2.3.2.1 Safety Evaluation. A preliminary hazard analysis was conducted for all WUCs. This qualitative evaluation was conducted using MIL-STD-882 as a guideline. The safety categories were redefined from the MIL-STD-882 descriptions as follows:

Category I - Negligible (Same as MIL-STD-882)

Category II - Marginal (Defined as any item which, if it failed, would probably cause loss of a mission.)

Category III - Critical (Combines the Category III and IV definitions of MIL-STD-882 and is defined as any item whose failure might cause loss of life or vehicle.)

Each WUC was evaluated and a safety category assigned based on experience with the F-106 aircraft and engineering judgment. In some cases, previously generated Failure Modes and Effects Analysis were utilized to obtain a categorization. Unfortunately these analyses covered less than one fourth of the WUCs under investigation. Technical orders and engineering documentation were reviewed to provide background information on system details and the SAAMA Flight Safety Prediction Technique was reviewed for data to complete the assignment of safety categories.

This is one of the most important steps in the analysis in that all safety-critical items must be identified so they can be given special consideration for inspection. This is in line with the general plan of inspecting flight critical items to enhance flight safety while letting other equipment operate to failure (where operationally and economically feasible) to reduce maintenance expenditures. Thus, it becomes imperative to identify the flight-safety critical aircraft items.

2.3.2.2 Criticality. Evaluation of the criticality of each WUC involves setting critical numbers for the quantity of ground and air aborts for each item as well as setting critical ratios for the number of malfunctions discovered on an inspection versus the total number of malfunctions discovered.

2.3.2.3 Aborts. A simplified maintainability evaluation was utilized to determine the critical abort numbers. A basic ground rule was to assure that new inspection packages would not degrade the abort rate and, if at all possible, would enhance the rate. Ground aborts were considered to be slightly less important from a safety standpoint than air aborts. These ground rules plus the F-106 abort rates and safety data were used in setting the critical values in Table 2-5.

These values were entered on the work sheets along with the safety categories and the ground and air aborts (from Task I printouts). Thus, if a given WUC has a safety category of III, with five or more ground aborts charged to that WUC, it is assumed that the WUC is flight safety critical and a "Yes" notation was entered in the Flight Safety Critical column of the work sheet. Similarly, if a WUC has a safety category

Table 2-5. Safety-Criticality Values

Safety	Ground Abort Critical No.	Air Abort Critical No.
Category I	20	15
Category II	10	5
Category III	5	1

of III and one or more air aborts, the WUC is assumed to be both flight-safety and flight-abort critical.

All WUCs were classified for flight safety and flight safety/abort criticality in accordance with these criteria.

2.3.2.4 Critical Ratio. This ratio describes both the importance and the effectiveness of inspecting specific WUCs. Determination of the critical ratios has been made utilizing the best engineering judgment of maintainability and safety engineers familiar with the F-106 aircraft. It should be emphasized that these ratios might change for other types of aircraft.

The ratios are keyed to both the safety category and the number of ground and air aborts. The principle being that the more safety critical an item is and the more ground or air aborts being caused by the item the less effective an inspection needs to be in order to be economically feasible, desirable or necessary. The F-106 critical ratios are given in Table 2-6.

Table 2-6. F-106 Critical Ratios

Safety Category	Aborts	Critical Ratio
I	None	1/3
	Ground and/or air	1/5
II	None	1/5
	Ground only	1/10
	Air only	1/20
	Ground and air	1/30
III	None	1/10
	Ground only	1/20
	Air only	1/30
	Ground and air	1/50

Ratios for each WUC are determined by dividing the total number of malfunctions for that WUC into the number of malfunctions discovered on a particular inspection for that WUC. If this ratio exceeds the critical ratio listed for the WUC the inspection is considered to be effective.

For example a WUC has a safety category of II, has both ground and air aborts, has a total of 10 malfunctions with 2 discovered on the periodic inspection. Since the ratio $2/10$ is greater than the critical ratio ($1/30$) from Table 2-5 a "Yes" answer would be inserted in the Inspection Effectiveness column. In the above example if there had been 100 total malfunctions the ratio $2/100$ is not greater than $1/30$ and a "No" would be inserted in the appropriate column.

2.3.2.5 Inspectability. Items for which inspections are required (based on decisions made from the critical ratio comparisons) were investigated to determine whether: 1) the item could be inspected using existing methods, aerospace ground equipment, etc., 2) the item was being inspected for the prevalent modes of failure (data from Task I), 3) the items could be inspected more efficiently than through use of current methods.

The yes or no answer is based principally on answering the question "is there some practical method of inspecting this item?" The avionics areas presented considerable difficulty at this stage of the analysis. It is generally believed that turning on the MA-1 system or any other piece of avionics on the ground (as part of a scheduled inspection) may be more detrimental than helpful. After the system has operated it is proved that it operated - that time. Now, will it operate the next time? The "turn-on failure" factor for avionics plus the fact that the MA-1 system accumulates up to five ground operating hours for every hour it operates in the air tended to bias the analysis against scheduled inspections of avionics. This bias is somewhat offset by the extremely high failure rate and mission criticality of certain parts of the MA-1 system.

In general the "turn it on to see if it works" type of inspection is to be avoided unless the inspected item exhibits definite wearout modes of failure (as opposed to purely random failures). Thus, inspection of lighting systems and similar items are severely restricted in that only wiring, switches and similar devices may be visually inspected from time to time but the system will normally be operated to failure and then fixed on an unscheduled basis.

Mechanical systems and items subject to definite wearout patterns will be inspected at intervals determined by the interval analysis provided they are mission or safety critical. Otherwise they will be allowed to operate until failure and repaired by unscheduled maintenance actions.

The cost impact of adjustments made in the scheduled removal intervals of time-change items are evaluated in Section 2.8, Economic Analysis. In this analysis, the changes in intermediate and depot level labor costs and spares costs are determined.

2.4 MAINTENANCE NETWORK DEVELOPMENT

A maintenance network is a diagram which illustrates the major possible functional interrelationships found between systems undergoing maintenance. All F-106 systems are represented on both the hourly postflight and periodic networks. Systems which can be maintained concurrently are placed in parallel in the network. When systems are placed in series it is implied that no maintenance can be accomplished on the second system until maintenance on the first system is completed.

The networks are used in conjunction with the NAM (Network Analysis Model) as part of the effectiveness analysis to determine MTTR's (mean time to repair) for the major inspections. The network is used as a guide map upon which probabilities of maintenance are plotted to determine a critical-span-time path for the aircraft undergoing inspection.

Derivation of the networks required review of the technical maintenance data, usage data, power and workspace availability, and manloading. These items, along with the inevitable tradeoffs between extreme accuracy and excessive complexity, were combined to derive the networks illustrated in Figures 2-7 and 2-8, which describe the sequence of maintenance activities occurring during the aircraft downtime for scheduled inspection. These networks were derived following a detailed review of the F-106 hourly postflight and periodic inspection work cards to establish the dependency and interrelationship of the hardware inspection requirements. Circled numbers in Figures 2-7 and 2-8 indicate the following:

①	Review 11	Less	11J, 11K
②	Review 46	Less	46A, 46C, 46G, 46H, 46J
③	Review 23	Less	23K, 23M, 23N, 23Q, 23S
④	Review 45	Less	45E, 45J
⑤	Review 42	Less	42E, 42F, 42G
⑥	Review 41	Less	41F
⑦	Review 12	Less	12B
⑧	Review 13	Less	13C, J
⑨	Review 49	Less	49A

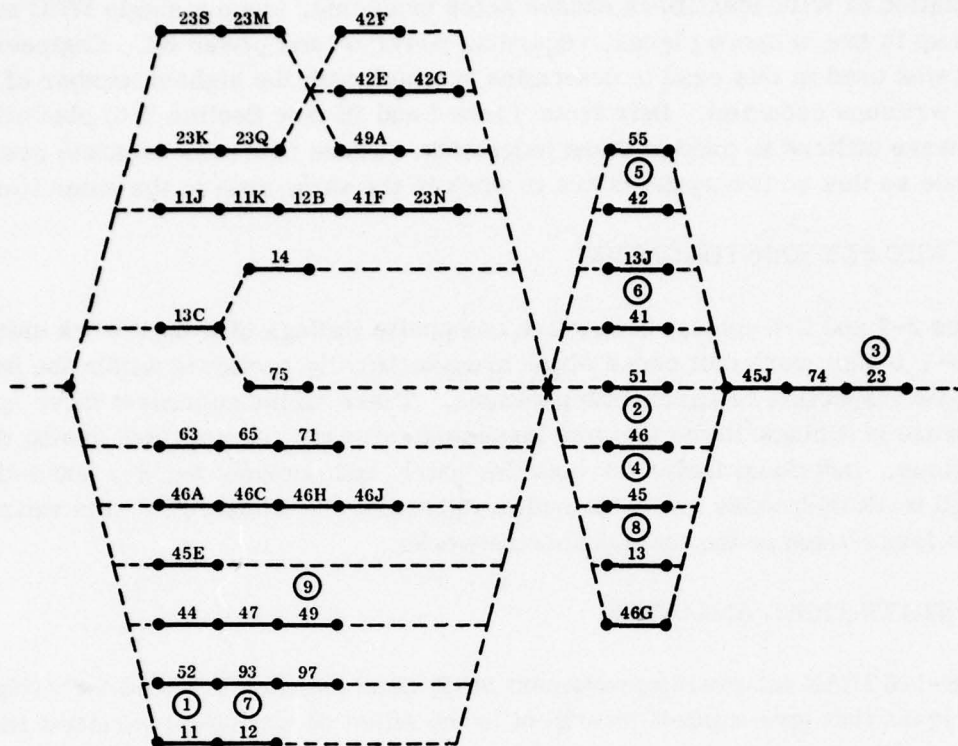


Figure 2-7. Composite Hourly Postflight Inspection Network

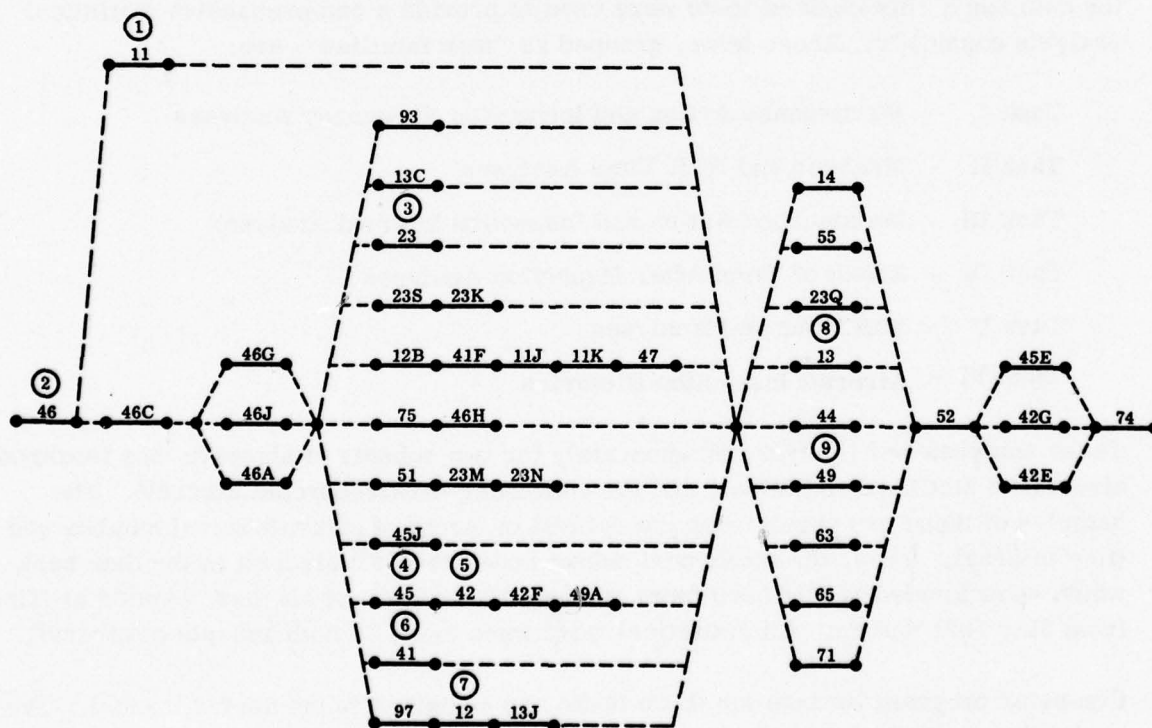


Figure 2-8. Periodic Inspection Network

Utilization of WUC identifiers causes some problems, since a single WUC number may show up in two or more places, regarding power on and power off. Engineering judgment was used in this case to determine in which path the highest number of maintenance writeups occurred. Data from Tasks I and III (see Section 2.6) plus other AFM66-1 data were utilized in making these judgments. These networks separate system maintenance so that no two systems are in work in the same area at the same time.

2.5 WUC SET IDENTIFICATION

Tables 2-7 and 2-8 contain respective composite listings of 5-digit work unit codes and 2-, 3-, 4-digit work unit codes which are specifically contained within the hourly and periodic inspection requirements packages. These tables represent those specific WUC hardware groupings/items that are inspected, checked, or serviced during these inspections. Individual tables for both the hourly and periodic 2-, 3-, and 4-digit and 5-digit work unit codes are contained in Appendix VI. These WUC sets were utilized in the formulation of the maintenance networks.

2.6 STATISTICAL ANALYSES

The F-106 IRAN Interval Improvement Study demonstrated the need for using analysis techniques that give explicit treatment to the effect of statistical variation inherent in the available maintenance data. The statistical analyses determined for this study define a "statistical survey" of 34 months of maintenance data for the 150 aircraft in the data bank. Six kinds of tests were used to provide a comprehensive statistical analysis capability. These tests, grouped as "task families", are:

- Task I - Maintenance Action and Inspection Frequency Analyses
- Task II - Manhour and NOR Time Analyses
- Task III - Maintenance Action and Inspection Interval Analyses
- Task IV - Effect of Time After Inspection Analyses
- Task V - WUC Removal Analyses
- Task VI - Aircraft Inspection Histories

These analyses were performed separately for two subsets of aircraft: the isochronal aircraft at McChord and Minot, and the remaining non-isochronal aircraft. The samples of these two populations are defined in terms of aircraft serial number and time interval. Thus, the isochronal subset consists of all aircraft in the data bank which were located at McChord from March 1971 and on and all those located at Minot from May 1971 and on. All statistical tests were made on both subsets of aircraft.

Computer program listings for these tasks are contained in the user's manual. The various statistical tests are described in the following paragraphs.

Table 2-7. Composite Five-Digit Work Unit Codes
(Hourly and Periodic)

11DCH	13DGI	23QQX	44DDI	51ACI
DEA	DHI	QQF	ECI	ADI
DEE	GCI	QRB	EFI	AGI
DFG	JBI	QRG		AHI
GAD	JFI	QSA	45ACI	BAI
HBI		QTE	AEI	BBI
JRI	14CCI	SQA	AGA	BFI
	CEI	SQL	AJA	EAI
12AAI	CGI	SQP	BCI	ECI
BAI	CHI	SQU	BEI	FCI
BFI	EMI	SRA	BGA	FDI
BLI	ENI	SRC	BJA	
	FAI	SRL	CAI	75DCI
13AAA	FBA		CBI	HBB
AAC	FCI	41AAI	CCI	HBC
AAD	GAI	ABI	CDI	KAB
AAE	CBI	AEI	CEI	
AAF	GCI	CAI	CFI	93AEI
ABI	GGI	CDI	EAI	AKI
ACI	HAI	CHI	EBA	AVI
ACA	HBI	CJI	EEI	97AAI
ACB	HGI	DAI	GAA	
ACC	JAI	DCI		
ACD	JBI	DDI	46AAI	
ACF	JCI	DFA	CHI	
ADI	JEI	EAI	CJI	
AEI	JFI	EBI	FBI	
AFI	JKI	FAI	FYI	
AGI		LAI	HBI	
AHI	23GQN	NAI	JAB	
BAI	HAE	NAC	JAC	
BBI	HAG		JBA	
BCI	HAH	42ADI	NCI	
BDI	HQD	AEI	PEI	
CFI	JAK	BEI		
DAI	LBA	CDI	47AAI	
DBI	MBA	CGI	ACB	
DCI	MRB	EAI	BAC	
DDI	MQA	ECI	BAN	
DEI	NQE	FGI		

Table 2-8. Composite 2, 3, and 4-Digit Work Unit Codes
(Hourly and Periodic)

11--	23KQ	46HB
11D-	23M-	46J-
11GA	23MR	46N-
11H-	23NQ	46P-
11HA	23P-	47--
11J-	23PQ	47B-
11JA	23Q-	
11K-	23QQ	49--
12B-	23QR	49A-
	23QS	
13--	23QT	51--
13A-	23S-	51A-
13AA	23SQ	51B-
13B-	23SR	51F-
13C-		42--
13D-	41--	
13E-	41A-	55AA
13J-	41C-	
	41N-	74--
14--	41NB	75--
14C-		75A-
14D-	42--	75B-
14E-	42A-	75C-
14F-	42E-	75D-
14G-	42F-	75DC
14H-	42G-	75E-
14J-	45--	75G-
	45C-	75K-
23--	45CA	
23EA	45CB	93--
23GQ	45D-	93A-
23H-	45E-	97--
23HA	45J-	97A-
23HB		97B-
23J-	46--	
23JA	46C-	
23JQ	46F-	
23K-	46G-	
23KA	46H-	

2.6.1 TASK I — FREQUENCY ANALYSES

2.6.1.1 Frequency of WUC Repair Action. The purpose of this test is to determine what kinds of malfunctions occur on a work unit code, and when they are discovered, and then compare these results with the definition of the scheduled inspections themselves. The results provide a basis for answering such questions as: Do the inspections discover the discrepancies they look for or are these more often discovered in some other phase of aircraft operations? Are there malfunctions discovered in other phases for which changes in the current inspection packages might be proposed?

The frequencies are obtained from record type four by accumulating the number of maintenance actions field for each WDC (when discovered code) and HMC (how malfunctioned code) for a specific WUC. Results are printed out in the matrix form presented in Figure 2-9.

As shown in Figure 2-9, the frequencies of occurrence of the various support general actions which correspond to different scheduled inspections are included in the matrix and associated with the appropriate WDC. In this way the scheduled inspection frequencies can be compared to the frequency of maintenance actions resulting from the inspection.

The calculation of the number of scheduled inspections is based on logic developed for determining the end of the inspection. Original logic in the programs for the

MALFUNCTION DISCOVERY PHASE	BEFORE FLIGHT ABORT - AIR CREW *	BEFORE FLIGHT NO ABORT - AIR CREW *	IN FLIGHT ABORT *	IN FLIGHT NO ABORT *	AFTER FLIGHT AIR CREW *	BETWEEN FLIGHTS GROUND CREW *	GROUND CREW NOT DEGRADED	BASIC POST FLIGHT INSPECTION	PRE FLIGHT INSPECTION	HOURLY POST FLIGHT INSPECTION	PERIODIC INSPECTION	GROUND ALERT DEGRADED	FUNCTIONAL CHECK FLIGHT	SPECIAL INSPECTION	QUALITY CONTROL	DEPOT CHECK *	MAINTENANCE DURING SCHEDULED CALIBRATION	NONDESTRUCTIVE INSPECTION	DURING UNSCHEDULED CALIBRATION	DURING MALFUNCTION ANALYSIS *	CORROSION CONTROL	UNCHEDULED MAINTENANCE *
WDCs	A	B	C	D	E	F	G	H	J	K	M	N	P	Q	R	S	T	U	V	2	4	.
WDC FREQ.																						
SUP. GEN. WUC	—	—	—	—	—	—	03109	03200 03210	03100	03300	03400	03109	04210 0421A	04XXX	—	03600	03320 03330	04610	—	—	04141	—
S. G. FREQ.	—	—	—	—	—	—									—			—	—			—
HMC FREQ.																						
HMC ₁																						
HMC ₂																						
HMC ₃																						
HMC ₄																						
...

* ALL WDCs MARKED (*) ARE ACCUMULATED FOR UNSCHEDULED MAINTENANCE.

Figure 2-9. Matrix of Maintenance Action and Support General Maintenance Action Frequencies

determination of the end of the inspection over a sequence of weeks was based on the number of units completed and the change in aircraft flying hours. It was found that this logic was inadequate, especially in the case of the major periodic and hourly postflight inspections, because of recording anomalies in AFM 66-1 data. In particular, the occurrence of recording gaps during the inspection, where records for the week were omitted, resulted in the calculation of spurious short-interval observations.

Additional logic developed to handle this problem allowed for recording-gaps in the data of two weeks for hourly and four weeks for periodics. These tests were chosen after analyzing the aircraft inspection histories, which give the accumulated flying hours per inspection type versus weeks for different aircraft.

The total number of unscheduled actions for the WUC is calculated for each HMC by accumulating the WDC frequencies designated by asterisk (*) in Figure 2-9.

2.6.1.2 Maintenance Action Frequencies at Three-Digit WUC Level. The frequencies generated for each WUC in task 2.6.1.1 are accumulated at the three-digit WUC levels. This is accomplished by matrix addition for those WUCs having the same initial three digits. The matrix format is also given by Figure 2-9. The greater number of different HMCs which result in this case add additional rows to the matrix.

The maintenance action frequency analyses were used extensively in the subsequent analyses of the maintenance program. Examples of output from these analyses are given in Table 2-9 for WUC 13DH1 - Brake Relay Valve, and in Table 2-10 for WUC 14FA1 - Control Valve and Actuator Assembly. The frequencies in the tables for preflight and basic postflight inspections do not agree with actual practice. This discrepancy is the result of the way in which these inspections are recorded, as previously discussed.

2.6.2 TASK II - MANHOUR AND NOR TIME ANALYSES

2.6.2.1 Frequency Distributions of NORM Hours and Manhours by Type of Scheduled Inspection. The purpose of this task is to determine the variation in NORM hours and manhours charged to each type of scheduled or special inspection. Any NOR time charged during preflights and basic postflights is recorded as unscheduled maintenance. Manhours expended during the look phase of these inspections is charged as support general, however, so these inspections are included when calculating the look-phase manhour distributions.

For a given type of scheduled inspection, each occurrence of that inspection on an aircraft provides an observation of the NORM hours charged during the look and repair phases of the inspection and the manhours charged during the look phase.

To calculate the NORM hours for the inspection, the first Type 3 record encountered with the support general work unit code corresponding to that inspection is combined

[illegible]

with records for immediately succeeding weeks with the same code until the end of a continuous block of weekly records is reached. The NORM hours sum for the inspection is obtained by accumulating the NORM hours recorded in this block of records. Manhours for the look phase of this inspection are obtained by accumulating the manhours in the same way.

From the sets of NORM hour and manhour totals thus obtained for each aircraft scheduled inspection of a given type, cumulative probability distributions are then generated.

The distributions of NORM hours for hourly postflight inspections and periodic inspections generated by the program are given in Figures 2-10 and 2-11. According to Figure 2-11, the flow time for a PE averages about 14.5 days and can be as long as 30 days.

Look-phase manhour distributions for hourly postflight inspections and periodic inspections are given in Figures 2-12 and 2-13. These results show that inspection manhours for a periodic inspection average about 304 MH and can be as high as 800 MH.

2.6.2.2 Frequency Distributions of Manhours, NORM and NORS Hours for Maintenance Actions. The purpose of this test is to determine the number of manhours required for maintenance actions on specific WUCs, either repair actions stemming from inspections or unscheduled maintenance actions. In addition, the NORM and NORS hours charged against specific WUCs will be calculated.

Manhour distributions for maintenance actions are calculated by accumulating the number of manhours charged against a specific WUC and specific HMC for successive weeks until a week is encountered with a non-zero number of maintenance actions. The number of maintenance actions on the same WUC is accumulated at the same time. These data are obtained from record type 4. The ratio of these totals provides one observation of manhours per maintenance action for this WUC malfunction. Each occurrence of a maintenance action on an aircraft in the bank for the specific WUC-HMC combination provides another observation.

The distribution for unscheduled NORM hours is obtained in the same fashion except that unscheduled maintenance actions only are included in this case. Again NORM hours and maintenance actions totals are accumulated from week to week until a non-zero number of maintenance actions field is encountered. The ratio of the two totals then provides one observation of unscheduled NORM hours per maintenance action for the specific WUC. Data for this calculation are obtained from record type 3.

Calculation of the NORS hours rate is somewhat different. In this case, the parameter is NORS hours per week for a specific work unit code. Each aircraft week in the subset

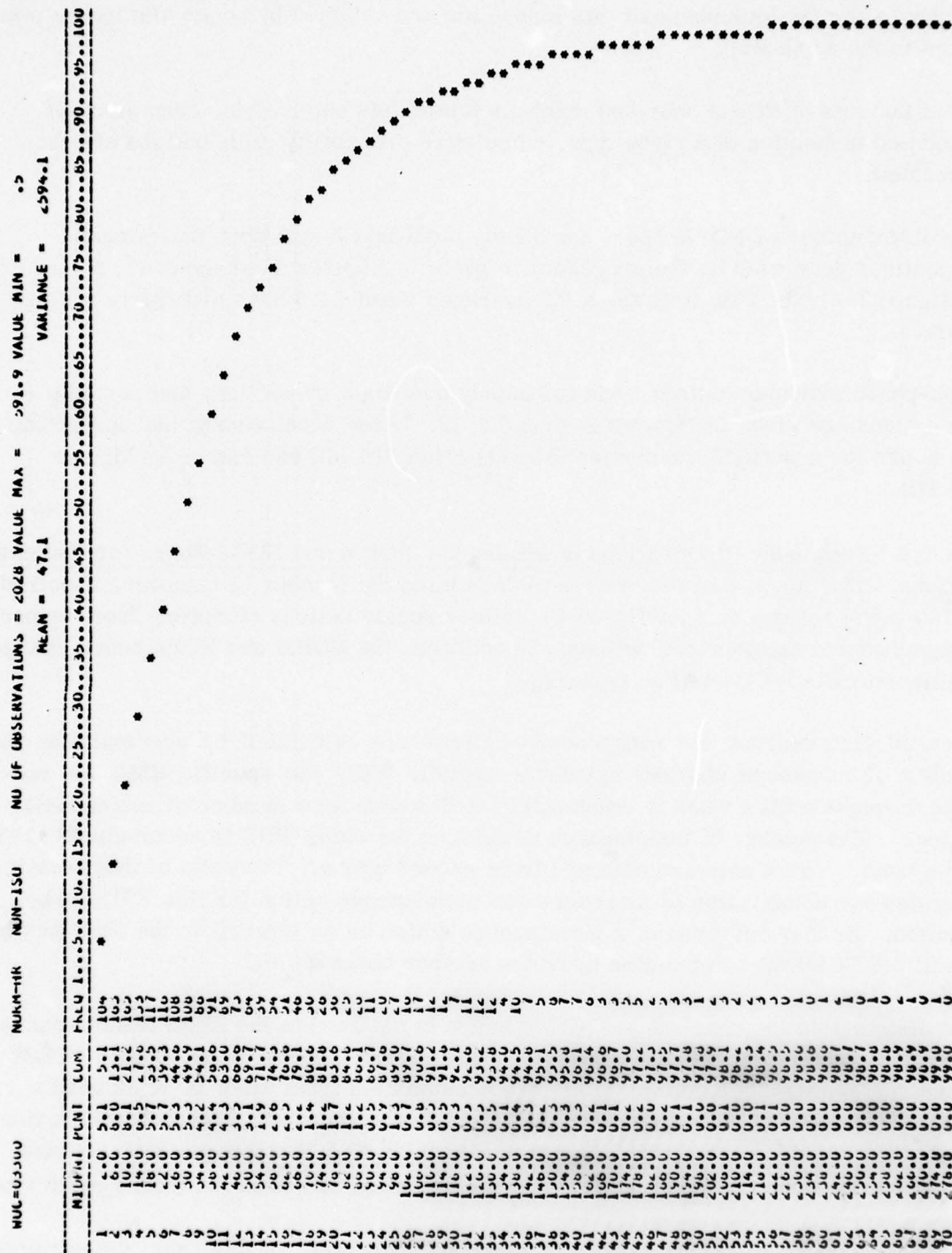


Figure 2-10. Hourly Postflight Inspection NORM Hours Distribution



Figure 2-11. Periodic Inspection NORM Hours Distribution

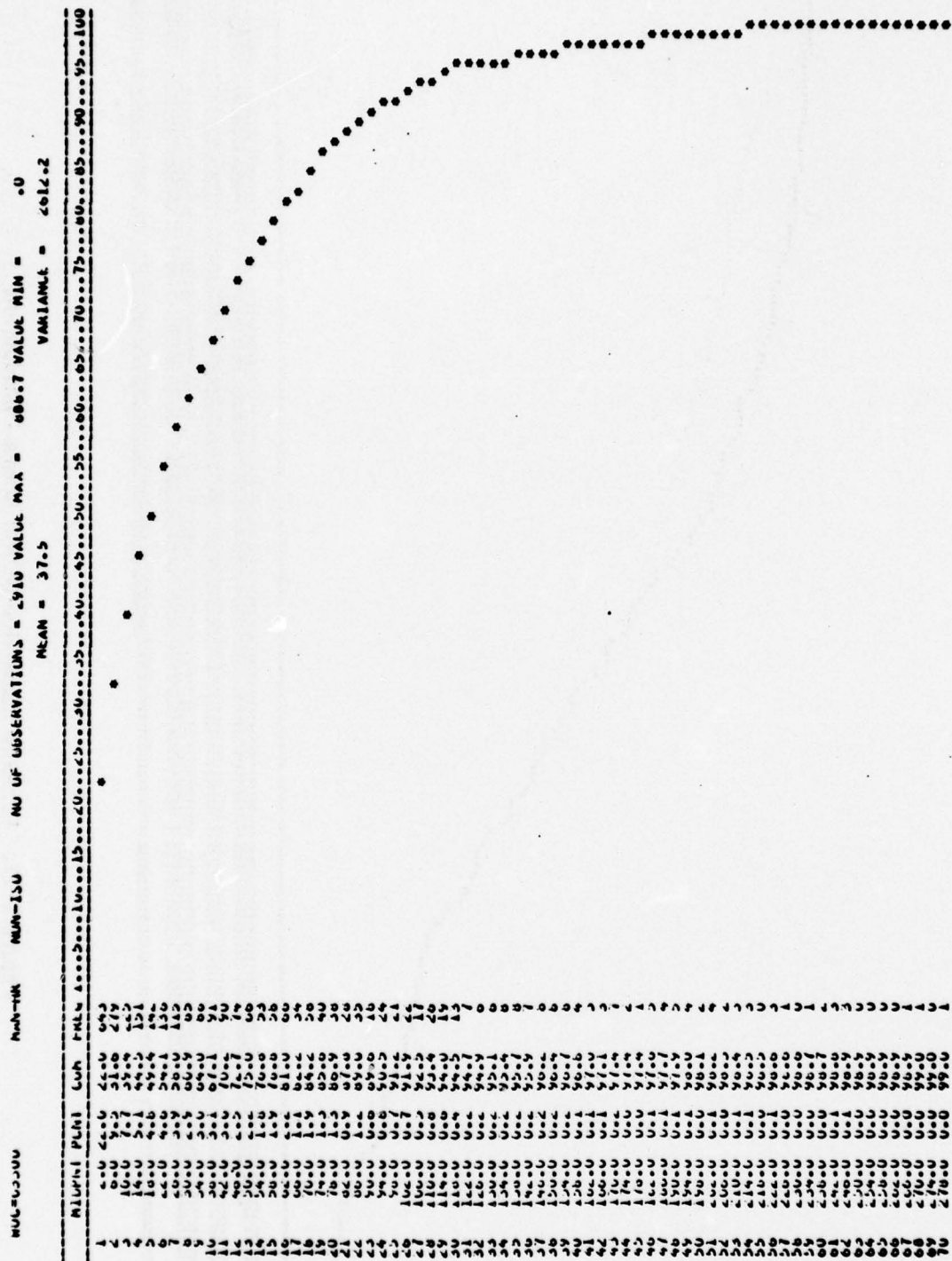


Figure 2-12. Hourly Postflight Inspection Look-Phase Manhour Distribution

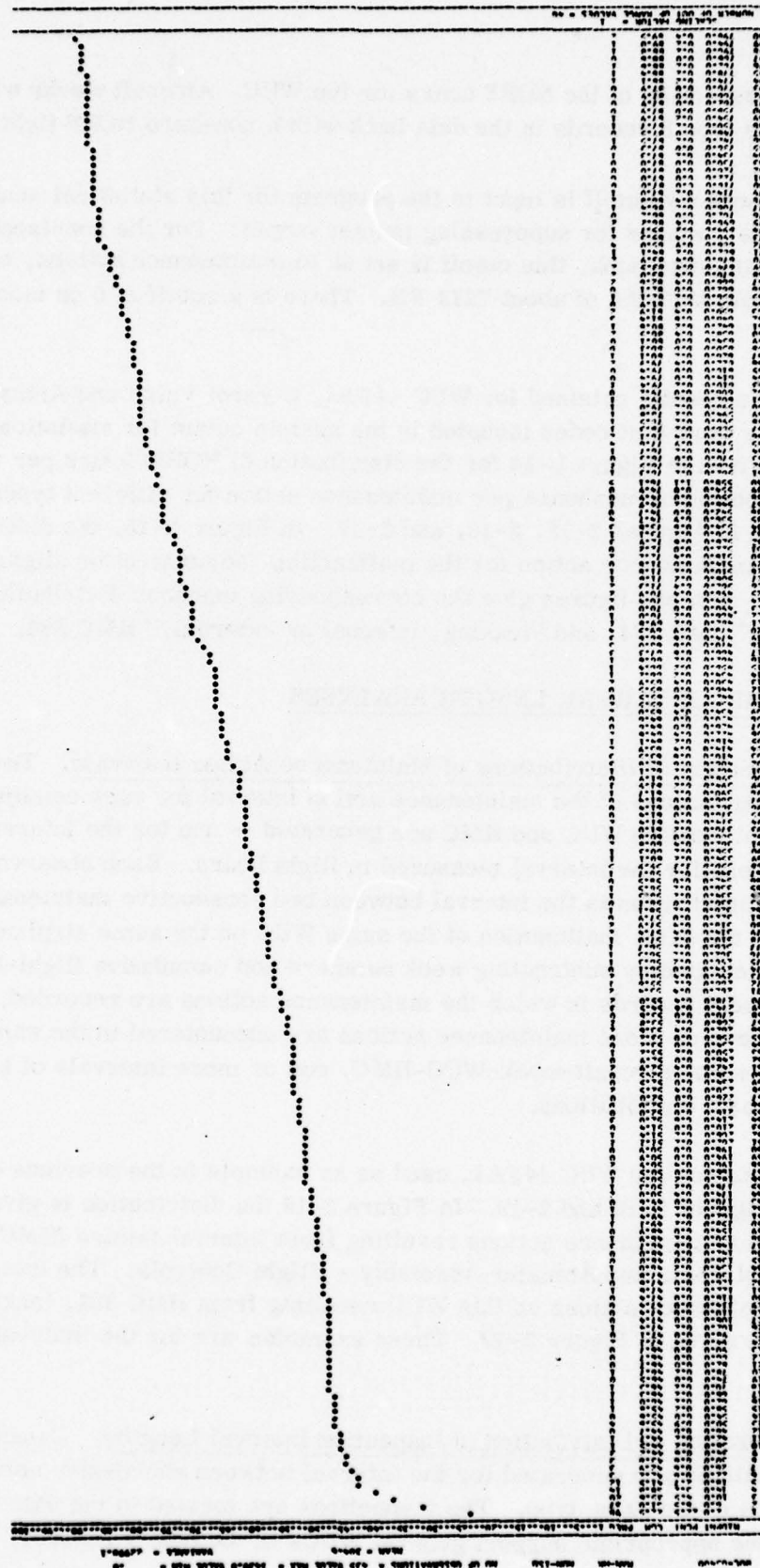


Figure 2-13. Periodic Inspection Look-Phase Manhour Distribution

provides an observation of the NORS hours for the WUC. Aircraft weeks with non-zero NORS are those type 3 records in the data bank with a non-zero NORS field.

A threshold frequency cutoff is input to the program for this statistical analysis program to provide a means for suppressing printer output. For the non-isochronal aircraft in the F-106 data bank, this cutoff is set at 15 maintenance actions, corresponding to a threshold MTBMA of about 7233 FH. There is a cutoff of 5 on isochronal aircraft.

Examples of the results obtained for WUC 14FA1, Control Valve and Actuator Assembly - one of the work unit codes included in the sample output for statistical analysis Task I - are given in Figure 2-14 for the distribution of NORM hours per maintenance action. Distribution of manhours per maintenance action for different types of malfunctions are given in Figures 2-15, 2-16, and 2-17. In Figure 2-15, the distribution of manhours per maintenance action for the malfunction "adjustment or alignment improper" is shown. The next two figures give the corresponding manhour distributions for "internal failure," HMC 374, and "leaking, internal or external," HMC 381.

2.6.3 TASK III - INTERVAL LENGTH ANALYSES

2.6.3.1 Generation of Distributions of Maintenance Action Intervals. Two cumulative probability distributions of the maintenance action interval for each combination of equipment-identification WUC and HMC are generated - one for the interval measured in weeks, and one for the interval measured in flight hours. Each observation used to generate a distribution is the interval between two consecutive maintenance actions resulting from the same malfunction of the same WUC on the same airplane. All intervals are calculated by subtracting week numbers and cumulative flight-hour totals found in the type 4 records in which the maintenance actions are recorded. It follows that whenever two or more maintenance actions are encountered in the same type 4 record for the same aircraft-week-WUC-HMC, one or more intervals of zero length is included in both distributions.

The results obtained for WUC 14FA1, used as an example in the previous discussions, are given in Figures 2-18 and 2-19. In Figure 2-18 the distribution is given for the interval between maintenance actions resulting from interval failure (HMC 374) on 14FA1, Control Valve and Actuator Assembly - Flight Controls. The interval distribution for maintenance actions on this WUC resulting from HMC 381, leaking-internal or external, is given in Figure 2-19. These examples are for the interval measured in weeks.

2.6.3.2 Generation of Distribution of Inspection Interval Lengths. Cumulative probability distributions are generated for the interval between successive occurrences of two inspections of the same type. The inspections are located in the data bank by checking for the appropriate support general WUCs in the type 3 records. The

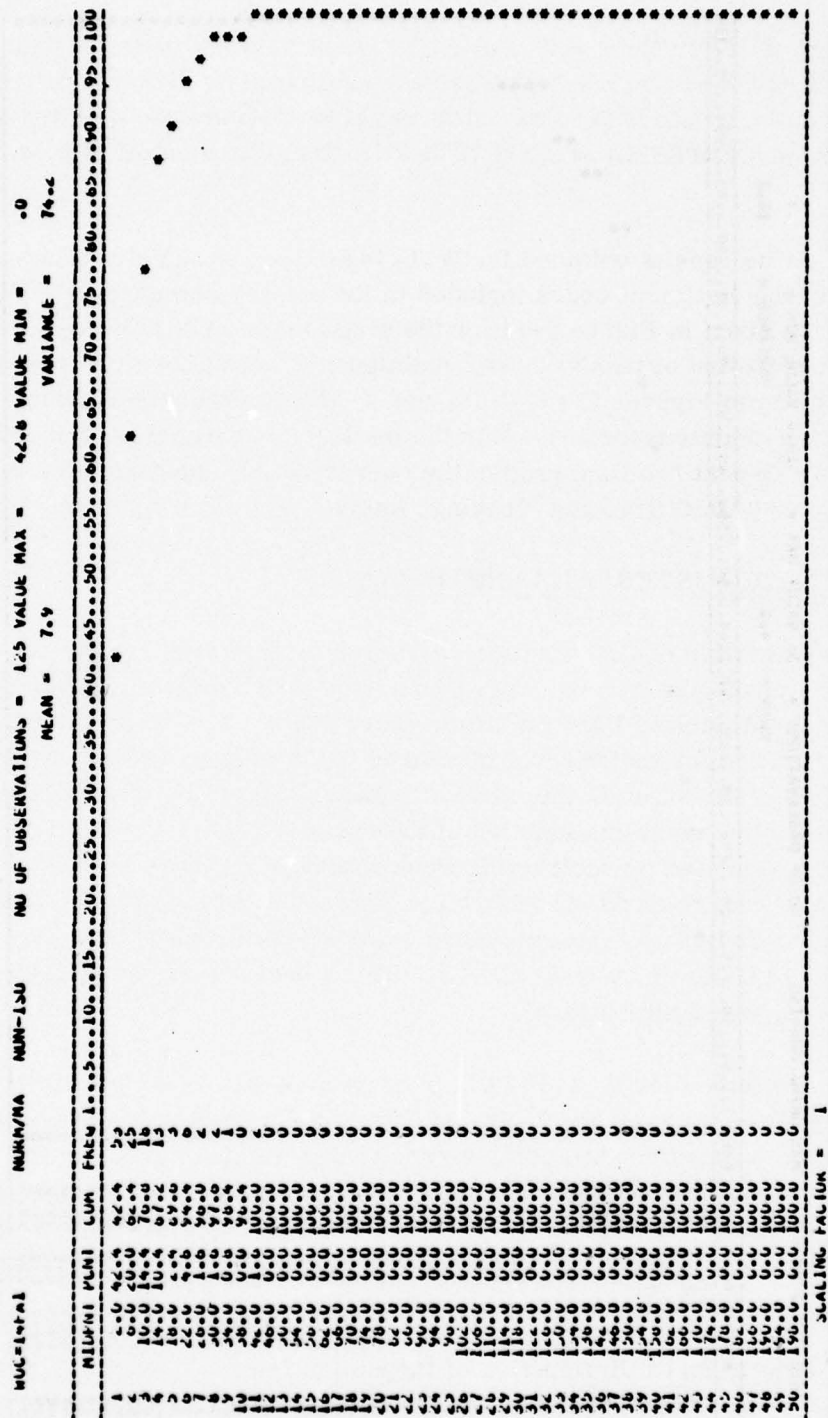


Figure 2-14. Distribution of NORM Hours per Maintenance Action for WUC 14FA1

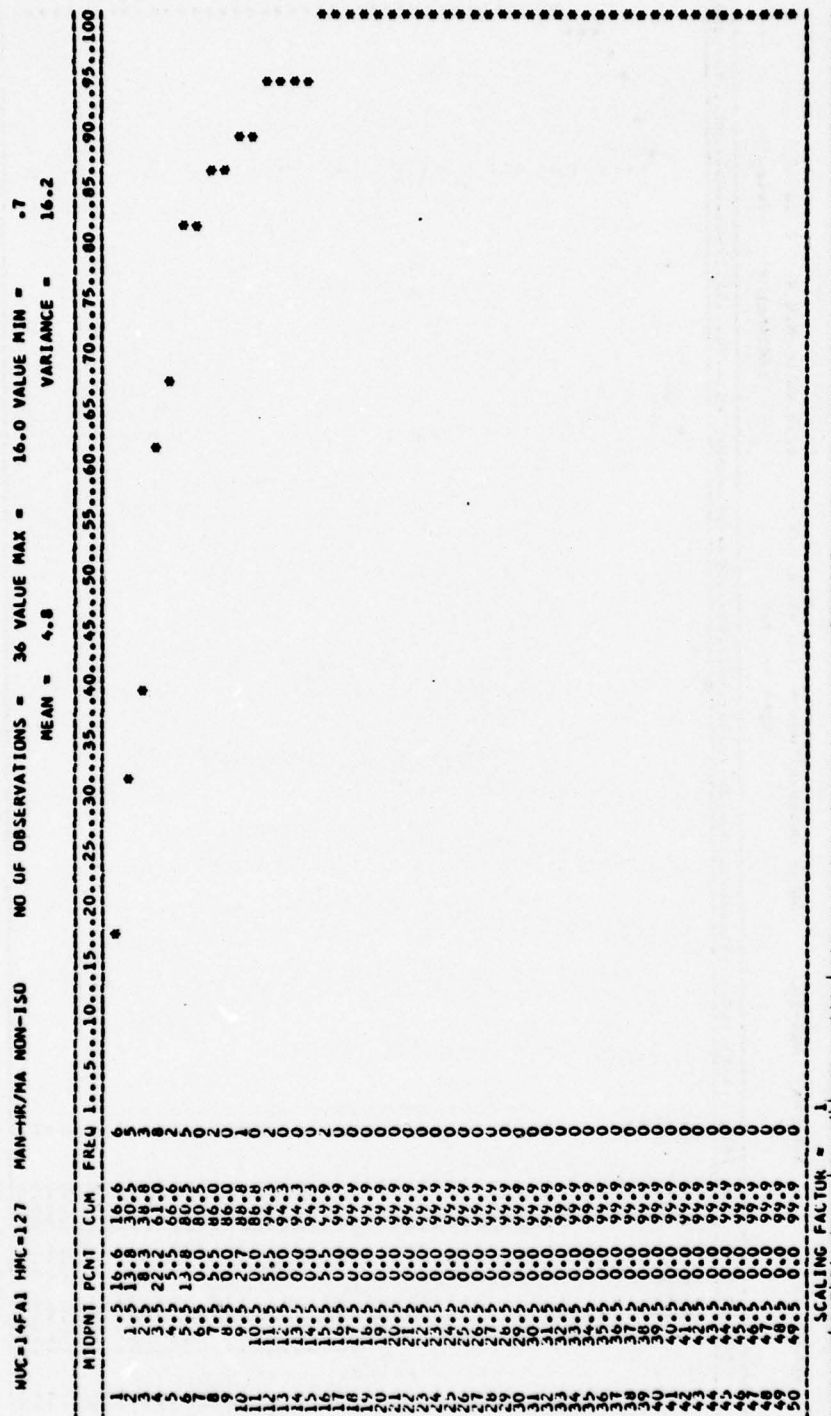


Figure 2-15. Distribution of Manhours per Maintenance Action for WUC 14FA1 — Malfunction: Adjustment or Alignment Improper

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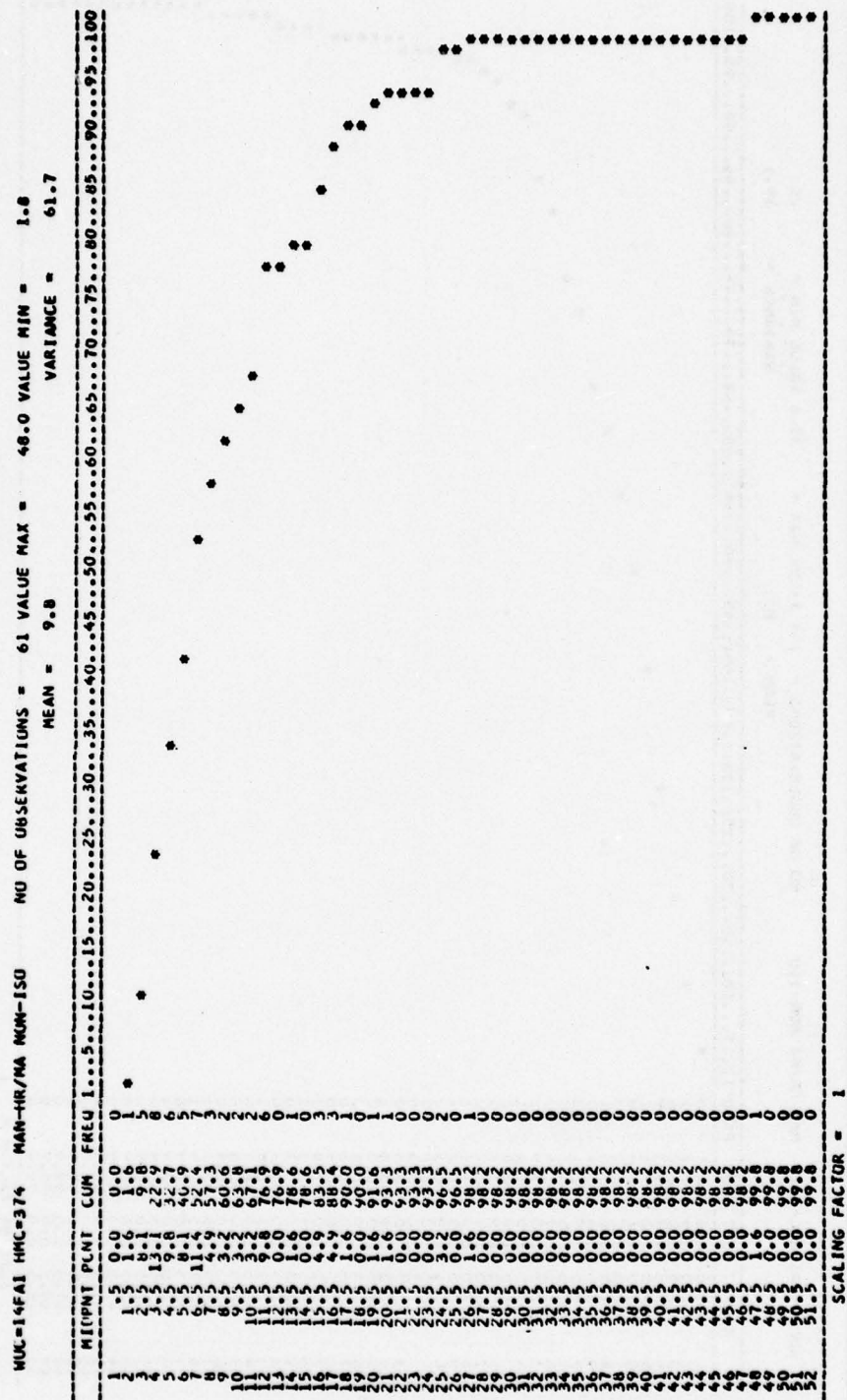


Figure 2-16. Distribution of Manhours per Maintenance Action for WUC 14FA1 — Malfunction: Internal Failure

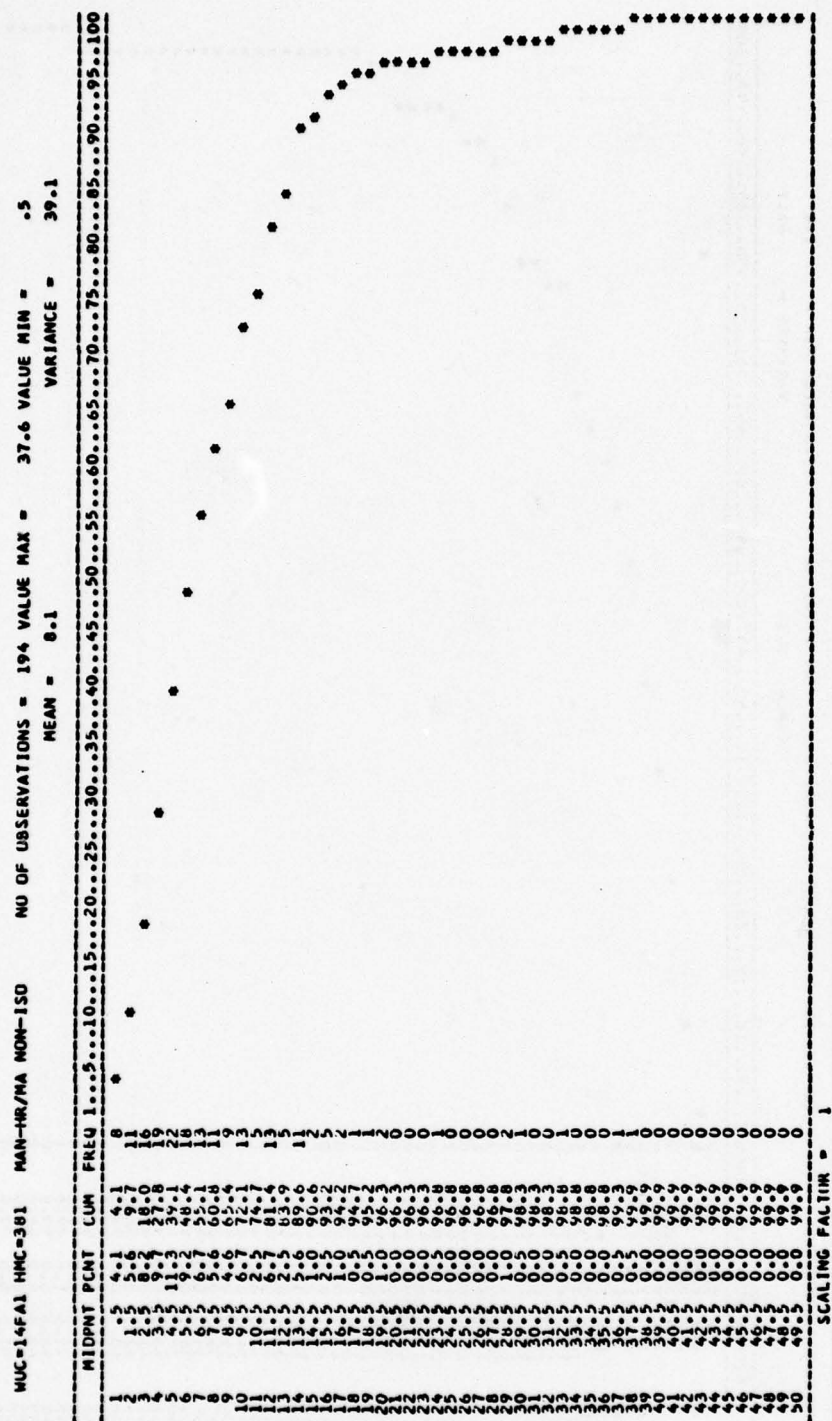


Figure 2-17. Distribution of Manhours per Maintenance Action for 14AF1 — Malfunction: Leaking, Internal or External

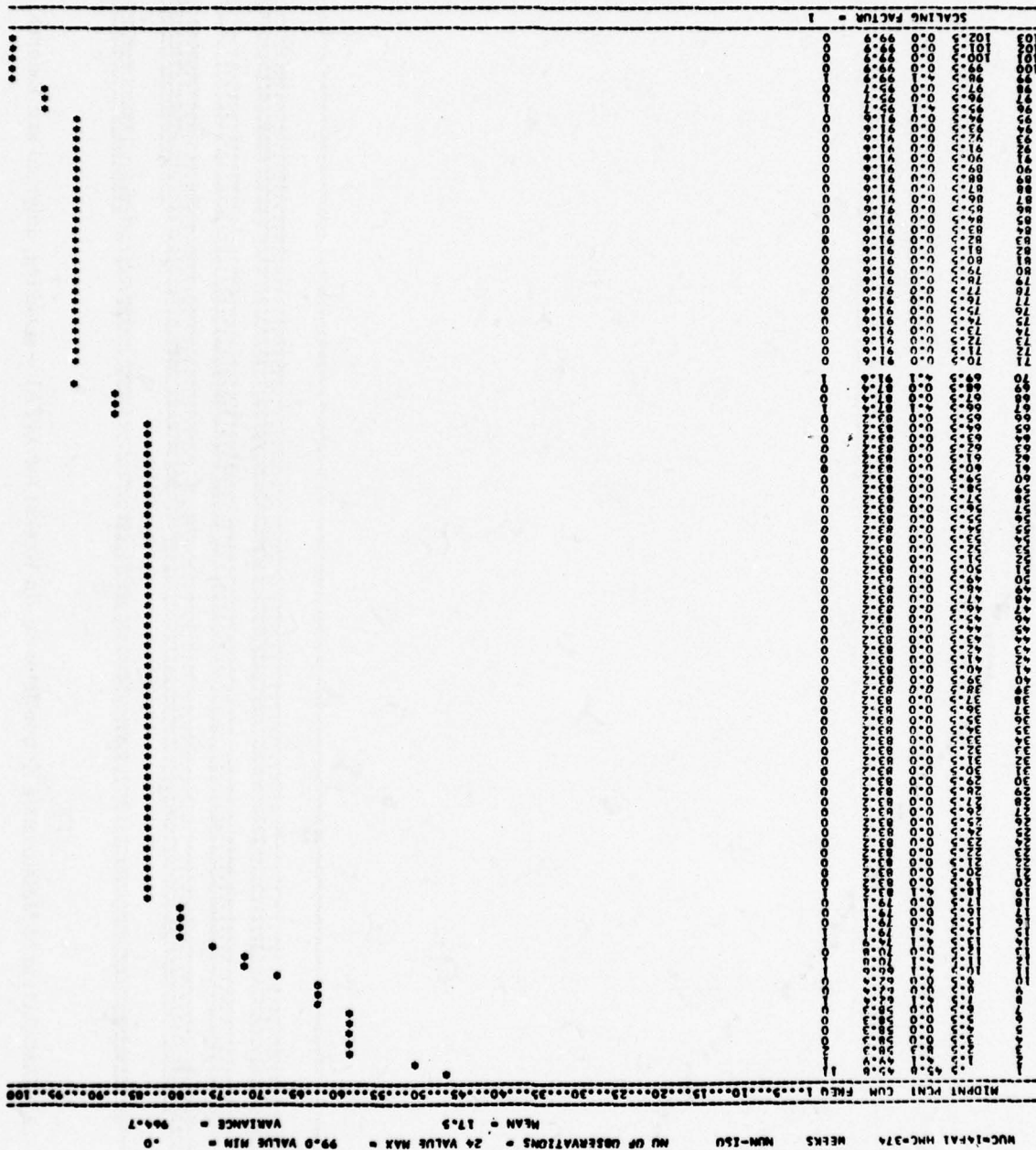


Figure 2-18. Distribution of Maintenance Action Interval (in Weeks) for 14FA1 - Internal Failure

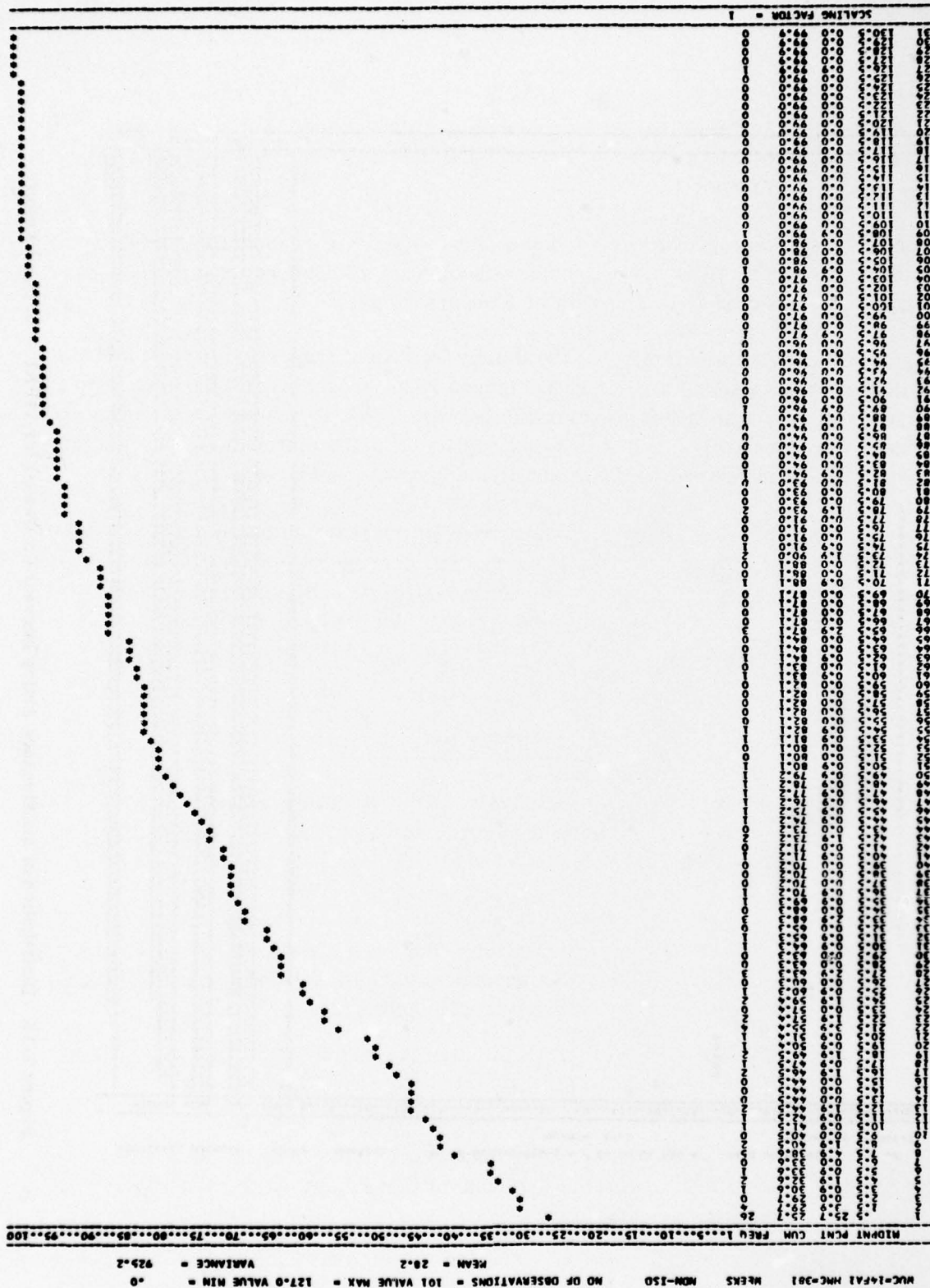


Figure 2-19. Distribution of Maintenance Action Interval (in Weeks) for 14FA1 - Leaking, Internal and External

inspection interval is defined to be the period between the end of one inspection and the start of the next. As for the maintenance action intervals above, the inspection intervals are measured in both weeks and flight hours. For each inspection, the data bank has only one type 3 record short enough to be performed in less than a week. However, long inspections lead to a number of data bank records for consecutive weeks. Therefore, it is necessary to determine the week numbers for both the start and the end of each inspection.

This program also has provisions for input of a frequency threshold on the number of interval length observations, which for non-isochronal aircraft is set at 10 observations and for isochronal aircraft is set at 4 observations.

Examples of the results obtained for the Hourly Postflight Inspection (03300) and the Periodic Inspection (03400) are given in Figures 2-20 through 2-23. Figures 2-20 and 2-21 give the distributions for the intervals between HPOs as measured in weeks and flying hours, respectively. Figures 2-22 and 2-23 give the distributions for the intervals between PEs measured in weeks and flying hours, respectively.

It was very difficult to develop a computer program logic which could correctly determine the actual end of the inspection in every case because of the anomalies in recording the inspections. For this reason, the interval-length analysis for PEs was repeated using the results obtained from the aircraft inspection histories discussed below. As expected, the computer-generated distributions imply shorter interval lengths.

2.6.4 TASK IV — EFFECT OF TIME AFTER INSPECTION

2.6.4.1 Correlation and Regression Analysis. The effect on maintenance requirements and effectiveness parameters of time after an inspection is determined using correlation and regression analyses. The independent variables are the following measures of time after the inspection.

- a. The number of weeks since the inspection. For each observation, this includes the week for which the values of the dependent variables are determined, but not the week during which the inspection was completed.
- b. The number of flight hours accumulated since the inspection. This includes all flight hours for the week of the observation but none of the flight hours for the week during which the inspection was completed.
- c. The number of sorties flown since the inspection. This includes all sorties flown during the week of the observation but none of those flown during the week during which the inspection was completed.
- d. The number of landings performed since the inspection. Included are all landings performed during the week of the observation but none of those performed during the week in which the inspection was completed.

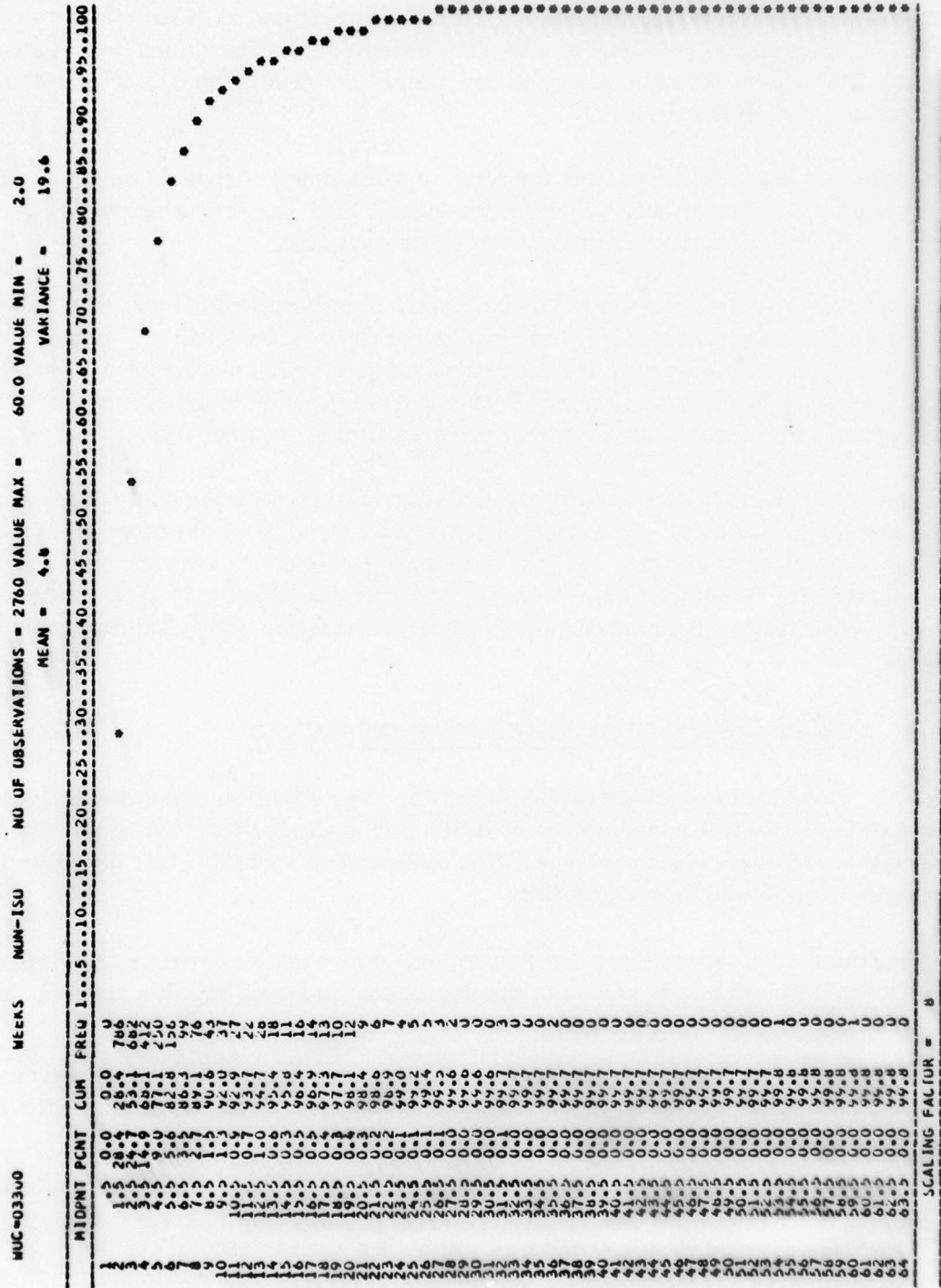


Figure 2-20. Interval Distribution for Hourly Postflights (Weeks)

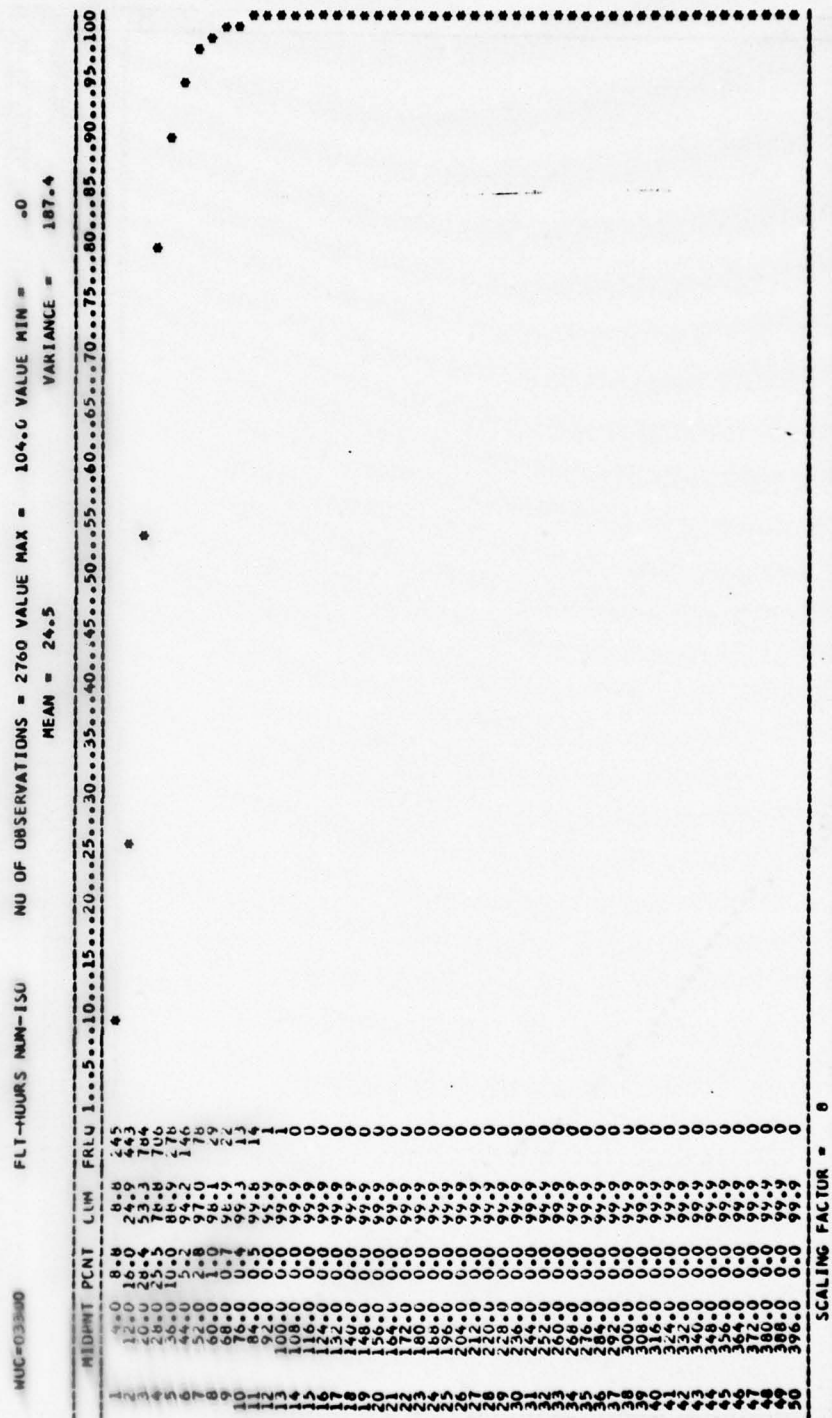


Figure 2-21. Interval Distribution for Hourly Postflights (Flying Hours)

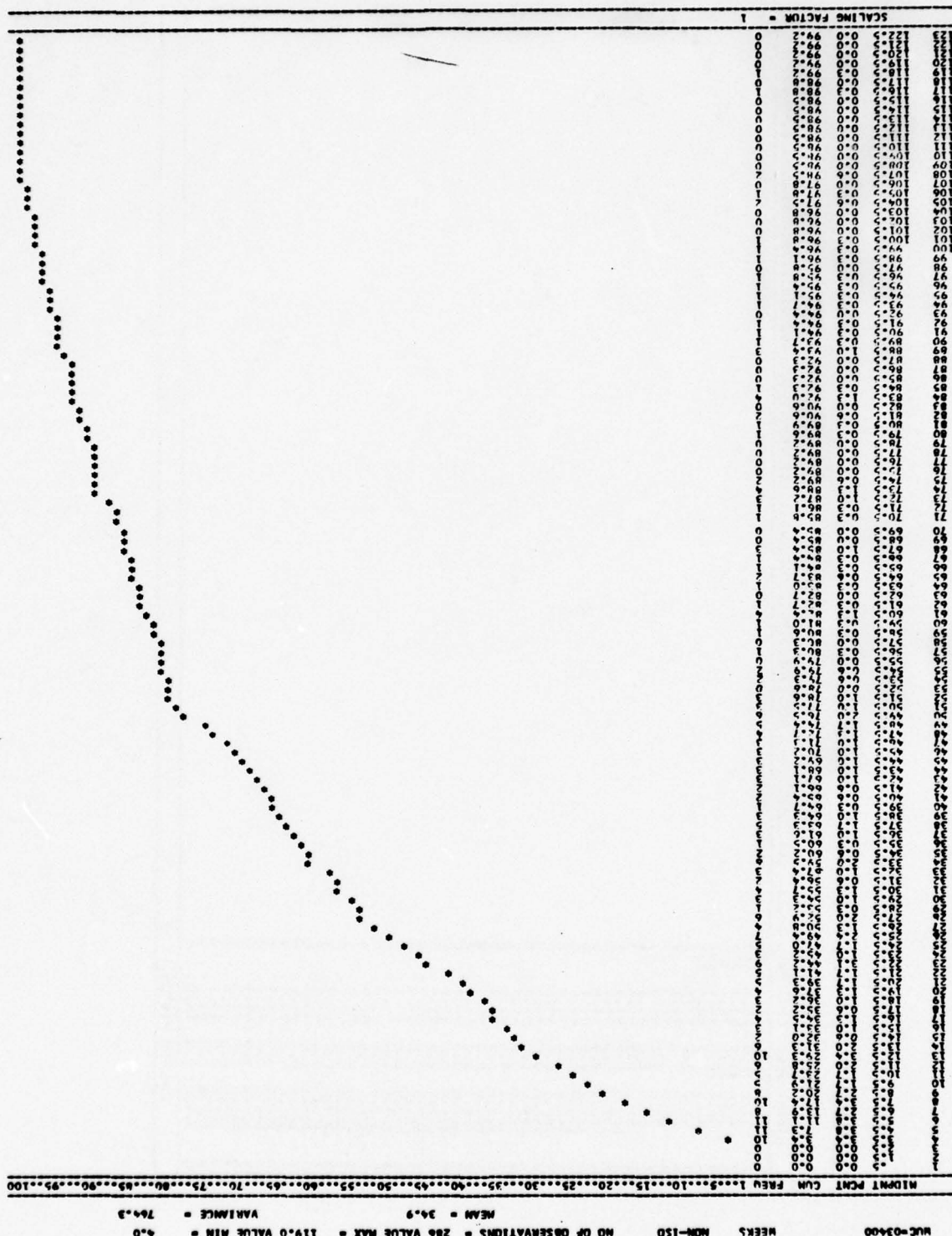


Figure 2-22. Interval Distribution for Periodic Inspections (Weeks)

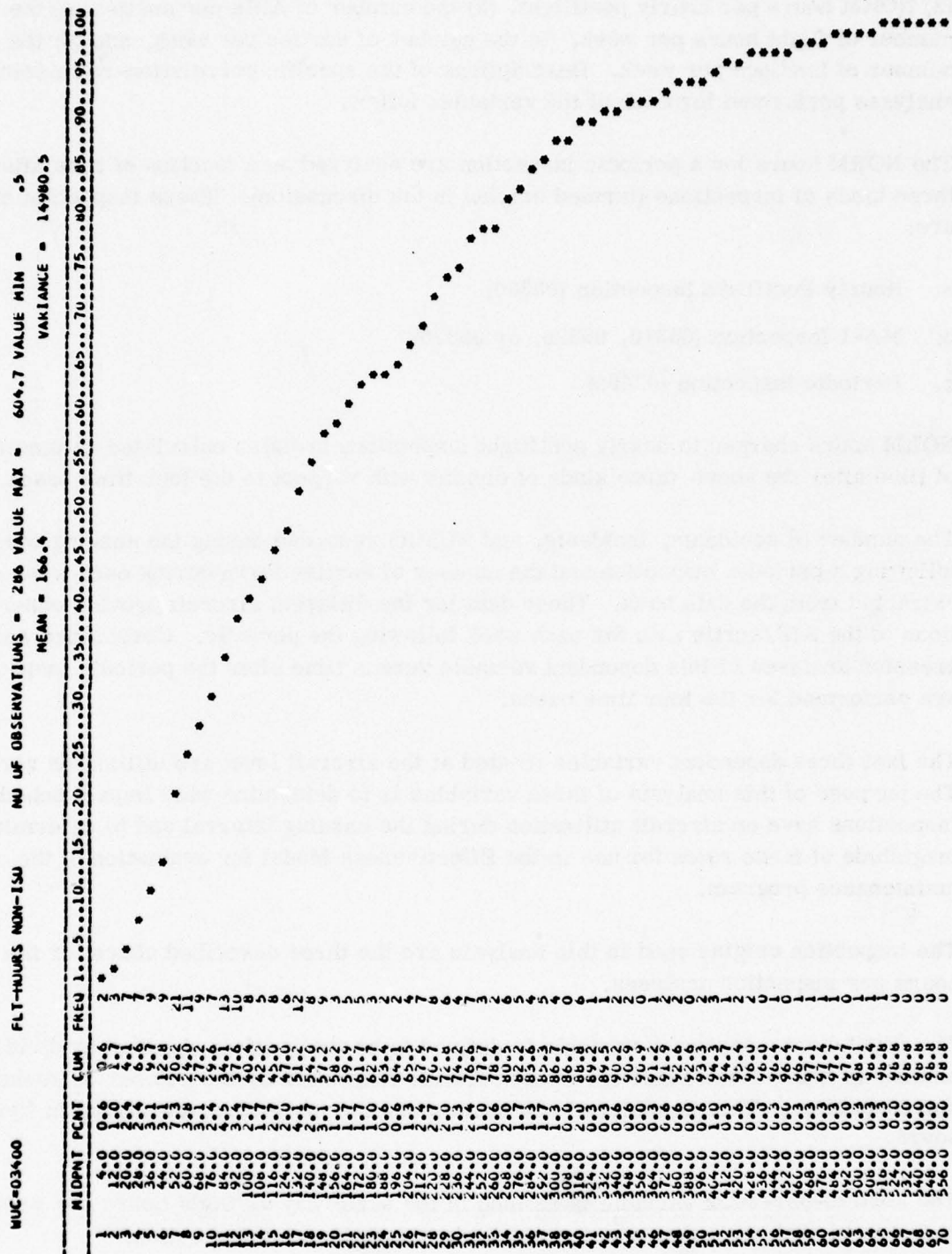


Figure 2-23. Interval Distribution for Periodic Inspections (Flying Hours)

2.6.4.1.1 Aircraft Level. Certain dependent variables pertain to the total aircraft. At this level, the dependent variables are (1) NORM hours per periodic inspection, (2) NORM hours per hourly postflight, (3) the number of AIEs per sortie, (4) the number of flight hours per week, (5) the number of sorties per week, and (6) the number of landings per week. Descriptions of the specific correlation-regression analyses performed for each of the variables follow.

The NORM hours for a periodic inspection are analyzed as a function of time after three kinds of inspections (termed origins in the discussion). These inspection origins are:

- a. Hourly Postflight Inspection (03300)
- b. MA-1 Inspection (03310, 03320, or 03330)
- c. Periodic Inspection (03400)

NORM hours charged to hourly postflight inspections are also calculated as functions of time after the above three kinds of origins with respect to the four time bases.

The number of accidents, incidents, and EUMRs recorded during the ensuing weeks following a periodic inspection and the number of sorties flown during each week are extracted from the data bank. These data for the different aircraft provide observations of the AIE/sortie rate for each week following the periodic. Correlation and regression analyses of this dependent variable versus time after the periodic inspection are performed for the four time bases.

The last three dependent variables treated at the aircraft level are utilization variables. The purpose of this analysis of these variables is to determine what impact scheduled inspections have on aircraft utilization during the ensuing interval and to determine the magnitude of these rates for use in the Effectiveness Model for evaluation of the current maintenance program.

The inspection origins used in this analysis are the three described above for the NORM hours per inspection analyses.

The flight-hours-per-week variable is defined to be the quotient obtained by dividing the number of hours flown since the latest periodic inspection by the number of weeks since that inspection. This is analyzed with time since the inspection, measured in flying hours.

The sorties-per-week variable is defined in the same way as flight hours per week. It is analyzed with the independent variable, sorties since the inspection.

The landings-per-week variable is also defined in the same way. It is analyzed as a function of landings since the inspection.

2.6.4.1.2 WUC Set Level. Various sets of equipment-identification WUCs are defined by input data. These sets are those aggregates of work unit codes which pertain to the various branches in the network descriptions of the series and parallel organization of the scheduled inspections. The analyses for these WUC sets are performed for time after different types of scheduled inspections among the three origins described above, that is, the hourly postflight, MA-1, and periodic inspections.

The various dependent variables analyzed for each WUC set include unscheduled maintenance actions per unit time, number of maintenance actions (fix phase) per scheduled inspection by type, and number of abort maintenance actions per sortie.

For unscheduled maintenance actions the following correlation and regression analyses are performed:

- a. Number of unscheduled maintenance actions per week versus weeks after scheduled inspection.
- b. Number of unscheduled maintenance actions per flight hour versus flying hours after the scheduled inspection.
- c. Number of unscheduled maintenance actions per sortie versus sorties after the scheduled inspection.
- d. Number of unscheduled maintenance actions per landing versus landings after the scheduled inspection.

Unscheduled maintenance actions are those with when-discovered codes A, B, C, D, E, F, R, V, and 2, all noted with (*) in Figure 2-9. The unscheduled maintenance action frequencies are calculated as the quotients of the number of maintenance actions accumulated since an inspection and the number of time units accumulated. This quotient is then the average number of unscheduled actions per unit time up to that time after the inspection.

Correlation and regression analyses are then performed for each of the four dependent variables with respect to the corresponding time after variable.

The number of maintenance actions (fix phase) per inspection, by type, is calculated somewhat differently than the other dependent variables. For a given number of weeks after a given type of inspection, each aircraft provides a number of observations of whether or not a second type of inspection occurs in the given week. Each aircraft also provides a number of observations of the number of maintenance actions in the given week that result from the second type of inspection, as identified by the when discovered code. The number of maintenance actions per inspection for this inspection type is then the total number of these maintenance actions on all aircraft, divided by the total number of inspections of this type on all aircraft.

This variable is calculated for the same three types of inspections. For each type of inspection, time is measured in terms of each of the time bases from the latest occurrence of one of the three types of inspections. Correlation and regression analyses are made of the number of maintenance actions per inspection by type versus time after an inspection by type for each time base.

Finally, the number of abort maintenance actions per sortie is calculated and correlation and regression analyses are performed for this variable versus time after hourly postflights and time after periodics with respect to the four different time bases. The number of abort maintenance actions is the total number with when-discovered codes A or C, that is, the total number of maintenance actions resulting from malfunctions discovered either in flight or by the ground crew, resulting in an abort.

2.6.4.2 Trend Analysis. An analysis was performed to determine the trends of various data bank variables and the effects of scheduled inspections upon these trends. The variables included are the same as the dependent variables listed previously for the correlation and regression analysis. The data is collected, as above, at the aircraft and WUC set levels and uses the same WUC sets and inspection types as the correlation and regression analysis. The results are used to generate histograms of the mean value of the dependent variable versus time after the type of inspection. Class intervals for the time after variable are used in generating the histograms. Class interval lengths input for the F-106 are one week, five flying hours, three sorties, and three landings. In each case the mean value of the dependent variable is calculated for each time block following the inspection.

The programs for these statistical analyses also have provision for a frequency cutoff on output. This cutoff is set at four observations for the non-isochronal F-106s, and at zero for the isochronal aircraft.

The results obtained for 74A00 (MA-1/AN/ASQ-25 Radar Subsystem) are shown in Figures 2-24 through 2-27. As examples of the results produced by this statistical analysis, the correlation coefficients and regression lines are given for the number of unscheduled maintenance actions per week versus weeks after the periodic inspection, unscheduled maintenance actions per flight hour versus flying hours after the PE, the number of maintenance actions as a result of the MA-1 check per inspection versus flight hours after the PE, and the number of abort maintenance actions per sortie versus flight hours after the periodic inspection. The dashed lines in the figures represent the $\pm 1 \sigma_{\text{reg}}$ values for the dependent variable, r is the correlation coefficient, and N is the number of observations.

2.6.5 TASK V — REMOVAL ACTION ANALYSIS

2.6.5.1 Removal Action Frequency. The number of maintenance actions involving removal of a component from an aircraft is available for each week in a type

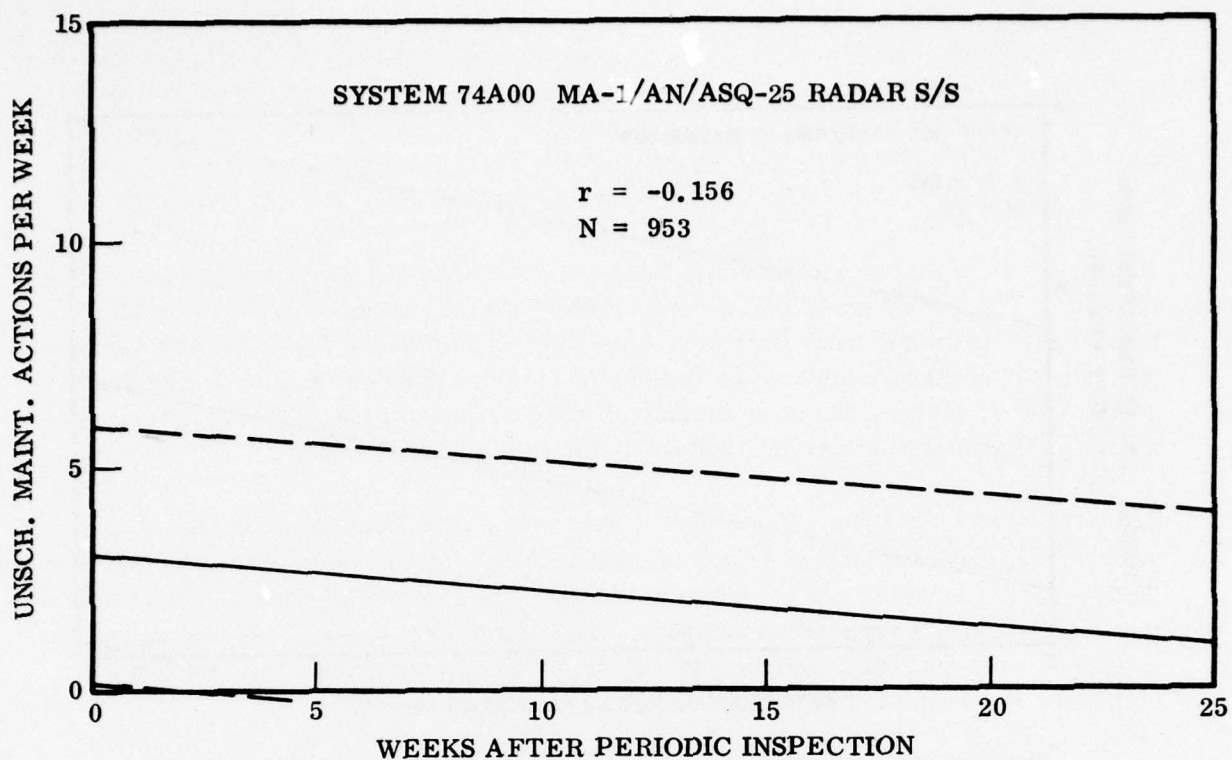


Figure 2-24. Number of Unscheduled Maintenance Actions per Week on 74A00

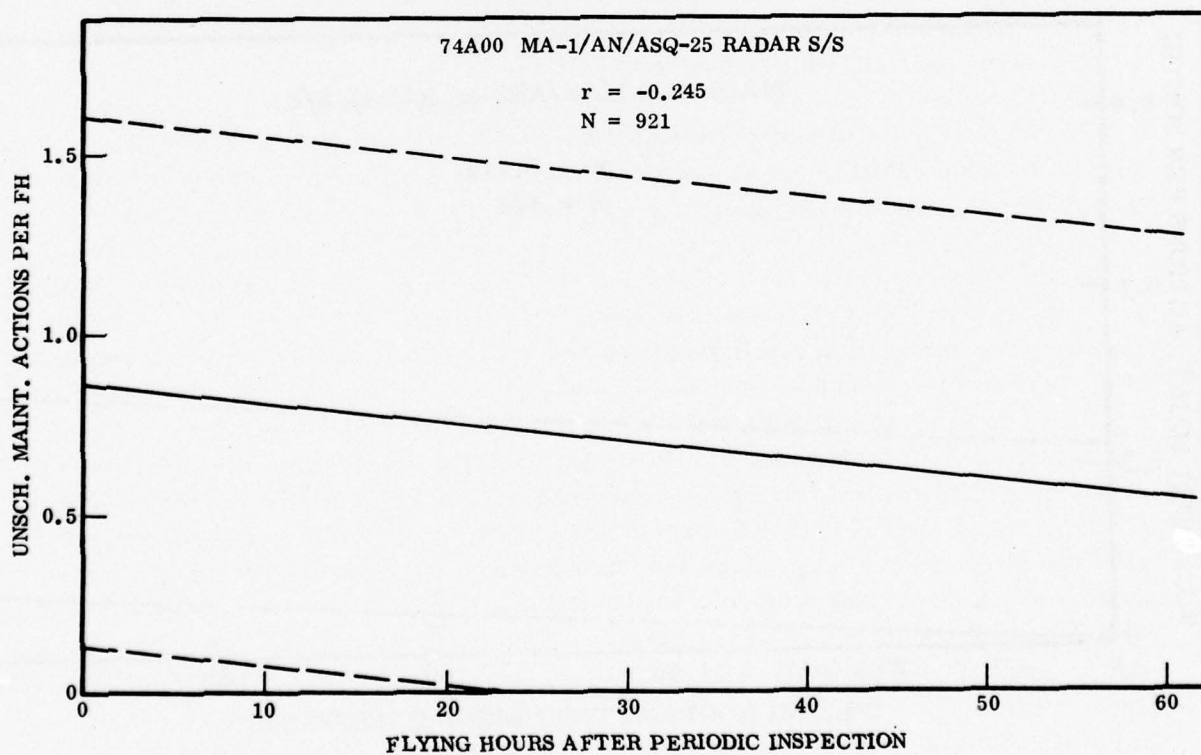


Figure 2-25. Number of Unscheduled Maintenance Actions per Flight Hour

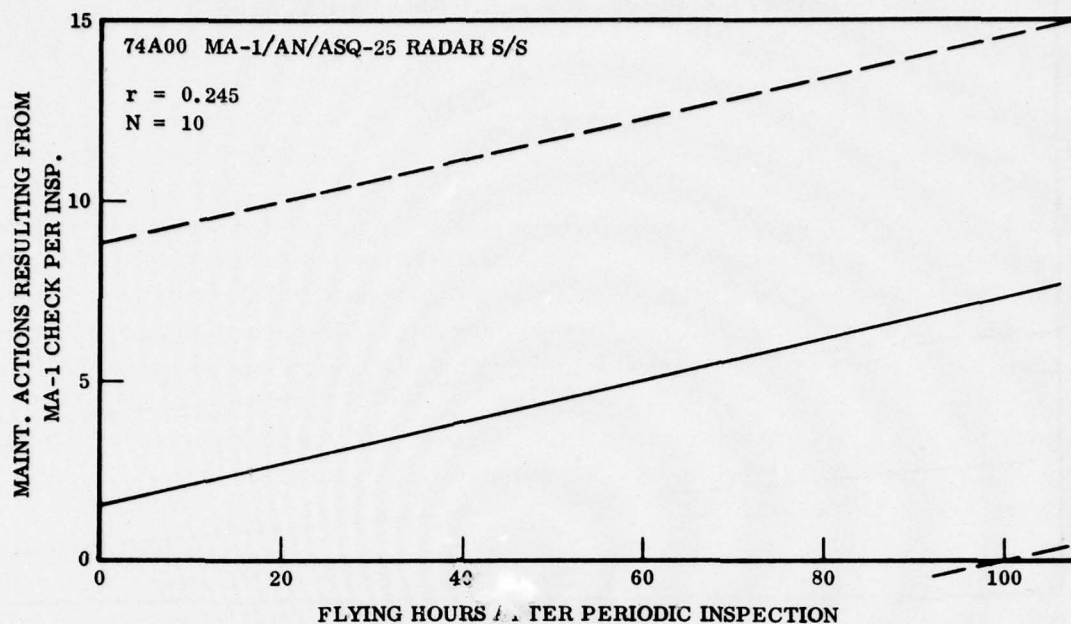


Figure 2-26. Number of Maintenance Actions Resulting from MA-1 Check per Inspection

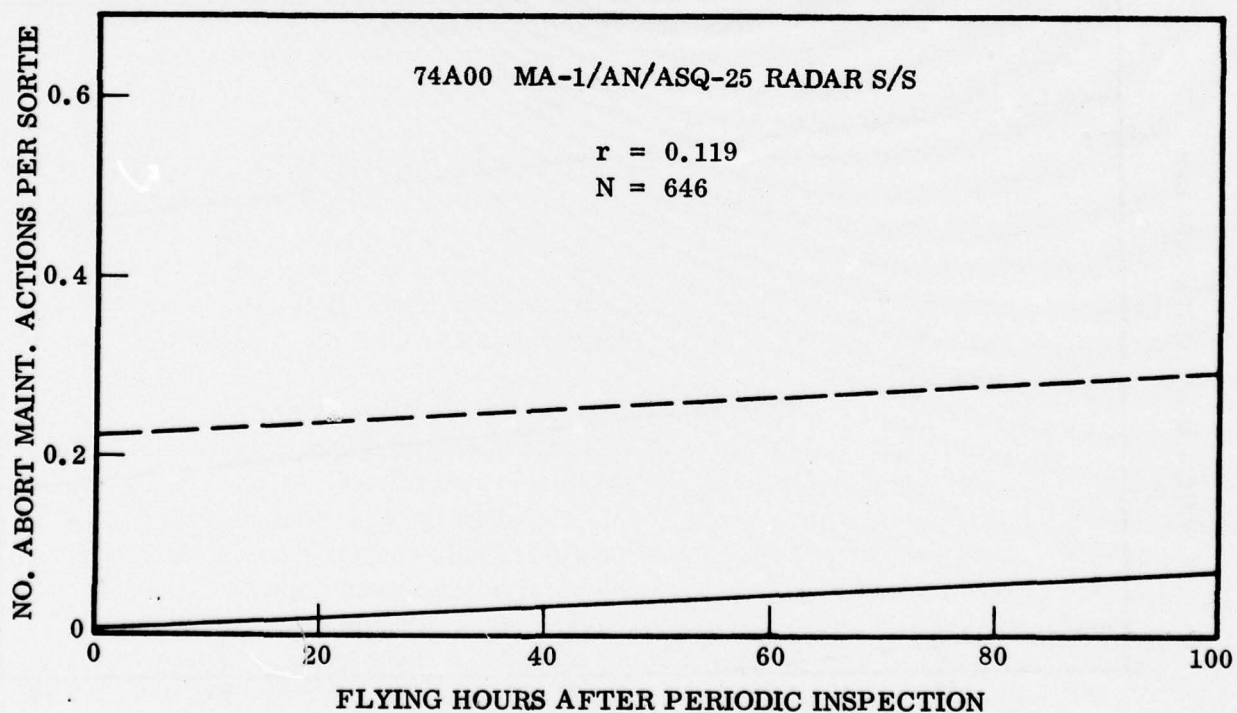


Figure 2-27. Number of Abort Maintenance Actions per Sortie

3 record. For each WUC, the total number of removals during the time period covered by the data bank is calculated by adding together the numbers of removals found in all the type 3 records for that WUC. The work unit codes are ranked in the order of their frequencies of removal and the resulting list printed as output, showing the total number of removals for each code. A second list is output with the codes and removal frequencies given in WUC order. No cutoff is used for this statistical analysis. The removal frequencies, ranked in order of decreasing frequency, are given in Table 2-11.

2.6.5.2 Removal Interval Analysis. This task consists of the generation of cumulative probability distributions for the intervals between removals of each work unit code. The method and results are similar to the generation of distributions described in Section 2.6.3 for the maintenance action intervals. This program has an output frequency cutoff of 4 for non-isochronal aircraft and zero for isochronal aircraft.

An example of the results produced by this program is given in Figure 2-28 for the same work unit code (14FA1) used as an example in the discussions of the other analyses, for purposes of comparison.

2.6.6 AIRCRAFT INSPECTION HISTORIES. The purpose of this analysis is to produce a plot of accumulated flying hours versus calendar time (in weeks) for inspections. Each week during which a given type of inspection occurs is plotted, using a designated plotting symbol for that inspection. The resulting plot provides a time sequence of events for the aircraft which aids in determining when the various inspections are completed. Figure 2-29 provides an example of an inspection history. These results provided a basis for the logic now incorporated in the programs for determining inspection duration.

Figure 2-29 is the actual inspection history for Serial No. 57002482. This figure shows that a PE was performed at weeks 219-221 (3/3/69 to 3/17/69), followed by an IRAN visit from week 266 to week 273 (1/26/70 to 3/16/70). Another periodic inspection was performed weeks 314 through 318 (12/28/70 to 1/25/71), and a third at week 352 (9/20/71). The intervals in flight hours between these inspections, shown circled in the figure, are 196, 182, and 154 flight hours, respectively.

The aircraft inspection histories for the 150 aircraft in the bank were processed as discussed in the example above, and distributions generated for the intervals between periodic inspections or IRAN visits and between periodic inspections only. The results are given in Figures 2-30 and 2-31. These distributions show conclusively that the periodics have been performed at intervals appreciably shorter than the specified 300 flight hours. The trend toward shorter intervals than 300 flight hours probably was the combined effect of scheduling periodics so as to maintain a smooth flow through the docks and a requirement to not exceed 300 flight hours. Consequently, aircraft were scheduled earlier than required. Further analysis of these data should be conducted to enable recommendation of a more efficient scheduling input method which would allow each aircraft to reach 300 FH (as a minimum) between periodic inspections.

Table 2-11. WUC Removal Frequencies - Non-Isochronal A/C

FREQ	WUC	FREQ	WUC	FREQ	WUC	FREQ	WUC
2395	74AR1	738	71AF1	360	74KA1	204	11CEA
2275	74CC1	737	52DC1	360	97AP1	204	41DFA
2042	13DC1	712	52DH1	357	14FA1	204	71GA1
2042	71CC1	710	42DA1	356	74BG1	201	11KK1
2014	71CA1	707	74HT1	345	74AP1	200	74FC1
1642	74AY1	705	74BN1	343	74AQ1	199	46GF1
1614	23KQA	679	44DD1	343	74BL1	199	55AA1
1590	52AA1	662	13GT1	329	74AB1	198	74APR
1457	74AF1	659	11CDA	326	44DH1	197	41FA1
1377	74AD1	657	52DJ1	326	47CD1	197	42GB1
1319	63BA1	640	74BQ1	319	41GH1	194	13DK1
1286	74AT1	636	11CFA	316	74HS1	194	44EF1
1273	42GA1	615	74AP5	313	74HL1	193	14DC1
1204	74LB1	614	75GO0	312	63AF1	193	74KR1
1166	52CB1	607	74APB	309	75BJ1	192	44FC1
1166	74FA1	585	74BZ1	308	23SRG	189	75BE1
1161	74AV1	583	74AK1	308	74KC1	188	12BA1
1137	71AB1	568	74FF1	303	74HW1	187	23NQA
1105	71CF1	561	11KJ1	299	55AC1	185	74KF1
1103	51EC1	554	52BC1	291	52CK1	181	44DF1
1096	71CD1	517	51FD1	288	47CA1	181	46CB1
1088	52BA1	510	52BJ1	279	51AH1	179	75EB1
1054	52BD1	507	41AC1	278	14DA1	178	74AP6
1028	65AC1	502	51DB1	277	74AS1	177	11HAA
1023	52BE1	502	74BX1	275	14DD1	177	44EC1
1023	71DC1	486	23SQA	274	74AN1	175	14HA1
984	52DG1	486	74HR1	274	74HA1	174	55AB1
981	52BB1	475	74FD1	269	52AH1	172	45DA1
975	74DC1	474	51EA1	266	23HAD	166	23SQM
971	13DD1	470	74AZ1	265	13DA1	166	52CH1
918	74KG1	465	42CA1	255	74BS1	166	74DD1
910	74BR1	463	47BA1	248	23SQJ	165	13BD1
906	52BG1	461	65AA1	246	51DH1	165	42CD1
891	52DF1	454	51DE1	246	74PJ1	164	41AE1
879	71AD1	453	71AE1	245	23G	163	74AEF
879	74BM1	453	71DA1	244	46GA1	161	41AD1
867	74APA	436	74AL1	241	45BF1	159	11CCA
849	52CF1	434	41CB1	238	13DE1	159	14DB1
846	13DH1	428	51EF1	238	74BT1	159	14JC1
840	74AX1	427	42DB1	237	14DE1	158	23SRK
828	11CBA	427	74BC1	233	74BA1	158	45EE1
825	71BB1	426	23Z	231	52DE1	157	11CGA
825	74LA1	410	74BJ1	228	74HP1	157	49BA1
811	52DB1	410	74PB1	227	74HC1	152	44FK1
798	74BB1	408	74HQ1	225	51ED1	152	45BS1
796	74APZ	403	75K00	223	74PE1	151	41KA1
788	74HV1	402	74HJ1	221	23HAL	149	47AE1
779	71BA1	389	52AJ1	215	74HU1	149	71CE1
778	74CJ1	387	74CA1	213	74HE1	147	13DB1
771	55AD1	377	74HX1	212	45AF1	144	51AJ1
768	74KE1	370	74HM1	209	45AT1	142	23MSB

Table 2-11. WUC Removal Frequencies - Non-Isochronal A/C, Cont.

FREQ	WUC	FREQ	WUC	FREQ	WUC	FREQ	WUC
141	71GB1	106	97AJ1	79	74BCB	55	74AP8
140	46PD1	105	74LE1	78	13AH1	54	41EA1
138	41AH1	104	23SQB	78	75BF1	54	42EG1
137	23MTB	104	44FG1	77	45BK1	54	44F00
137	47AA1	103	11JAE	77	74AU1	54	46AP1
136	41HB1	103	41CD1	77	97BD1	54	46CT1
136	51EB1	103	93AB1	74	51FA1	54	51BA1
135	52CA1	101	13AE1	74	93AD1	54	74BV1
134	23MTA	101	23QTA	73	74A00	53	11CA1
132	45EM1	99	51FC1	72	47ACC	53	14GA1
132	75BB1	99	65AF1	72	49BJ1	53	63AG1
129	74PG1	99	74BE1	71	23SQE	52	13AC1
128	74BH1	98	97AE1	71	75EBA	52	23LAC
128	74HH1	97	97AM1	70	13EG1	52	45HA1
127	74HD1	94	14EC1	70	52AF1	52	52AG1
127	74PC1	94	23SRA	70	65BA1	52	52EE1
127	75EA1	94	45BE1	70	74CB1	52	97BC1
126	44FM1	94	46CG1	69	23HAF	50	13AG1
125	51AG1	94	47BAC	69	41HA1	50	42FL1
125	51FB1	93	23MRB	69	74DB1	50	51AC1
125	52AK1	93	51BB1	68	51EE1	50	52EA1
124	13BA1	93	52DK1	67	46GG1	50	63AM1
123	42CG1	92	23MRA	66	75BA1	50	74AJ1
123	74PH1	92	23QSA	66	97AH1	50	75ABB
122	13CA1	91	41PB1	64	14JA1	50	97AQ1
122	13DG1	91	45AK1	64	23QRF	49	13CN1
122	51DD1	91	52BF1	64	46PE1	49	42AF1
121	23MSA	91	52DD1	64	75DAK	49	51AF1
120	97AF1	90	23JAJ	63	14GN1	48	14CJ1
119	23OO0	88	13AF1	63	42EC1	48	23JAK
119	41BF1	88	74CH1	63	74AP2	48	23QRH
119	42BA1	88	75BC1	62	11CF1	48	41FD1
119	95EA1	87	51BF1	62	42AG1	48	46FY1
118	11HAB	87	74APS	61	74CF1	48	46GB1
118	51GA1	87	74KD1	61	75BEC	48	46NF1
118	71CB1	86	65AG1	60	23HBA	48	52EC1
117	42EA1	85	46HBB	60	74QA1	48	74APY
116	74PF1	84	11CAA	59	12AE1	48	74BK1
116	97AC1	83	41CH1	58	13BC1	47	11AA1
114	11JAF	83	47AC1	58	45AE1	47	11DH0
114	41BJ1	83	74BP1	57	23QTE	47	13CD1
112	52DA1	83	74PK1	57	49AA1	47	14CG1
111	51DG1	83	75FF1	57	75AAB	47	23MUA
110	46HB1	82	23SQN	56	11JAB	47	47ACB
109	45CA1	81	41AF1	56	45DB1	47	74FA0
108	51DC1	81	41AG1	56	46HAB	46	14FC1
108	97AA1	80	13DEF	56	74ADG	46	14GC1
107	14JF1	80	51CD1	56	75BD1	46	41FF1
107	23SRD	79	46HAC	55	14JR1	46	46CA1
107	52AL1	79	71ABP	55	23JBD	46	46CZ3
106	51DF1	79	74APV	55	41BB1	45	11DEE

Table 2-11. WUC Removal Frequencies - Non-Isochronal A/C, Cont.

FREQ	WUC	FREQ	WUC	FREQ	WUC	FREQ	WUC
45	12AA1	35	11DHC	29	23SQQ	24	75FC1
45	13BE1	35	11JAD	29	51AD1	24	93AV1
45	14JQ1	35	14HG1	29	63AH1	23	11DFE
45	23MSC	35	23HAH	29	71BC1	23	13CF1
45	74PA1	35	46CJ1	29	74CN1	23	14JK1
44	46C00	35	46CP1	29	75DB1	23	23JB0
44	74AC1	35	46FZ3	28	13EJ1	23	23SRP
44	74APM	35	46HCB	28	14JJ1	23	42FB1
44	75O00	35	46QA1	28	23HAM	23	44GO0
43	46CD1	35	75EG1	28	44DE1	23	46CF1
43	46O00	34	23JQA	28	45AGA	23	46CL1
42	11DDE	34	44GA1	28	45EA1	23	51DJ1
42	13AA1	34	45CF1	28	45JC1	23	74CM1
42	13BF1	34	74AG1	28	46CH1	22	11CC1
42	45AA1	34	75AGB	28	46CK1	22	11DBE
42	74CD1	33	11CD1	28	46HA1	22	11FDC
42	74HB1	33	12AB1	28	51CA1	22	12BF1
41	11FD0	33	12BP1	28	51CB1	22	23QSE
41	46CE1	33	23KQC	28	52B00	22	41ED1
41	46NA1	33	41CJ1	28	74APK	22	41NDC
41	75BH1	33	44DB1	28	75AG1	22	42FA1
40	11JM1	33	44FF1	28	93AU1	22	45BA1
40	14CH1	33	75BDC	27	11O00	22	45GB1
40	41DE1	32	11DC0	27	14JB1	22	46FT1
40	41NCC	32	13AAC	27	23HBC	22	49BB1
40	51DK1	32	23C	27	75AGA	22	55AE1
40	52CC1	32	23S00	27	75BJA	22	71AK1
40	71CH1	32	41CC1	26	13CJ1	22	74BCA
40	75BG1	32	44DO0	26	13DJ1	22	75AF1
39	11JAA	32	46MA1	26	13JG1	22	75EBC
39	11JK1	32	49AAA	26	14CC1	22	97AN1
39	13JH1	32	49BG1	26	45JD1	21	13ACA
39	14JG1	32	75D00	26	46NC1	21	13BG1
39	71AC1	31	13CG1	26	74BY1	21	14GB1
38	11DE0	31	44DG1	26	74CK1	21	14HD1
38	46AA1	31	45FG1	26	75A00	21	23NQD
38	74KQ1	31	45EJ1	25	12BX1	21	41BD1
38	75DAA	31	46HC1	25	12DA1	21	41CG1
38	75FG1	31	49AC1	25	13EE1	21	42EB1
38	93AP1	31	75AFB	25	23SQD	21	46CV1
37	45DH1	30	12BB1	25	42BE1	21	46FA1
37	74AW1	30	13AAA	25	46CZ2	21	46GJ1
37	74CT1	30	13BB1	25	49AE1	21	55AF1
37	75KAA	30	13O00	25	74BW1	21	74CQA
36	12AD1	30	23LBA	25	74KV1	20	13FG1
36	12AF1	30	41NAA	25	75AJ1	20	23HBG
36	23SR0	30	71DJ1	25	75BFC	20	23SQC
36	41HC1	29	11GAC	24	11CB1	20	42FF1
36	74FB1	29	11JA1	24	14HH1	20	46AD1
36	75JB1	29	14JE1	24	41DA1	20	46DK1
35	11DCE	29	14JH1	24	51AE1	20	46DL1

Table 2-11. WUC Removal Frequencies - Non-Isochronal A/C, Cont.

FREQ	WUC	FREQ	WUC	FREQ	WUC	FREQ	WUC
20	49AF1	16	23NQE	14	74AEG	12	46JC1
20	63AP1	16	41BA1	14	75AB1	12	46RB1
20	65AH1	16	41BC1	14	75BBC	12	49BD1
20	74ADR	16	45AW1	14	75C00	12	74CQ1
20	75JCA	16	45BB1	14	75EBB	12	74CRB
20	75KB1	16	45CE1	14	75JBA	12	74DF1
19	11C00	16	45EB1	13	11DA0	12	74FG1
19	11DG0	16	46CU1	13	11JB1	12	75AA1
19	11JAC	16	47C00	13	11K00	12	75BM1
19	13EP1	16	71CG1	13	13AAD	12	75CAE
19	23KQM	16	74BD1	13	14CD1	12	75DAJ
19	23LAB	16	74H00	13	23JQJ	11	11DED
19	23SRQ	16	74KK1	13	23JQQ	11	11JD1
19	41GE1	16	75EF1	13	23KQ0	11	12BE1
19	42AE1	16	75FD1	13	23MAA	11	13AD1
19	42AK1	16	93AE1	13	23QQ0	11	13EN1
19	52AE1	15	11AC1	13	23SRJ	11	13GE1
19	71FC1	15	11DD0	13	42FC1	11	14GM1
19	74BF1	15	11EDD	13	45AM1	11	23MAB
19	74K00	15	11HA1	13	45BM1	11	41GP1
19	74PD1	15	12DD1	13	46CY1	11	45AB1
19	75JC1	15	14J00	13	46QB1	11	45AG1
18	11CJ1	15	23NQC	13	46QC1	11	45EG1
18	11J00	15	23SRE	13	63BK1	11	45EN1
18	12BW1	15	41KB1	13	65BC1	11	45GC1
18	14AA1	15	45AL1	13	74BU1	11	46AB1
18	23SRL	15	45BC1	13	74CR1	11	46AC1
18	44DA1	15	45CAA	13	74KB1	11	46A00
18	44FN1	15	45O00	13	74KM1	11	46GE1
18	45BW1	15	46CC1	13	75GH1	11	46RA1
18	45CC1	15	46GC1	13	97AU1	11	52CD1
18	46JAE	15	74ACA	12	11DAE	11	63AK1
18	46JD1	15	74BKB	12	11ECM	11	65A00
18	47BAD	15	75B00	12	11KD1	11	74HG1
18	63BG1	15	75EAC	12	13CE1	11	74PL1
18	71C00	15	75GA1	12	14AB1	11	75BBB
18	74O00	15	75KAF	12	23HB0	11	75DA1
18	75EAB	14	11CE1	12	23H00	11	75GBB
17	12A00	14	11DGE	12	23JAA	11	93AG1
17	12BG1	14	13EH1	12	41BG1	10	11EBG
17	14HB1	14	23JAG	12	41GF1	10	12BL1
17	23KQB	14	42AJ1	12	41O00	10	13ACB
17	23KQR	14	42AL1	12	42AD1	10	13C00
17	41AA1	14	42B00	12	42O00	10	14BA1
17	45AD1	14	42G00	12	44FE1	10	14FBA
17	45DE1	14	45AC1	12	45BGA	10	14HE1
17	45EC1	14	45JJ1	12	45CB1	10	14H00
17	93AJ1	14	46CX1	12	45JK1	10	23JBA
16	13CC1	14	46DU1	12	46AK1	10	23LA0
16	23HAG	14	46KB1	12	46GK1	10	23PQP
16	23JAF	14	49AL1	12	46H00	10	23PQX

Table 2-11. WUC Removal Frequencies - Non-Isochronal A/C, Cont.

FREQ	WUC	FREQ	WUC	FREQ	WUC	FREQ	WUC
10	23QRE	9	63B00	8	74CCE	6	11CG1
10	23SQF	9	65BE1	8	75CG1	6	11DB0
10	23SRH	9	71F00	8	75JH1	6	11DFA
10	41NCB	9	74DE1	8	75KAB	6	11ECC
10	41NDB	9	74DG1	8	75KC1	6	11FDD
10	42AH1	9	74HY1	7	11EDC	6	11HB1
10	45AJ1	9	75AD1	7	11GA0	6	11JL1
10	45ATA	9	75CA1	7	13ACF	6	12BZ1
10	45A00	9	75EAF	7	13CP1	6	13CH1
10	46CQ1	9	75ECA	7	13DL1	6	13EF1
10	46HCA	8	11FCM	7	13EEA	6	14AE1
10	46HCF	8	11GAF	7	13HD1	6	14O00
10	46SB1	8	11JH1	7	13JB1	6	23HA0
10	46S00	8	13AAF	7	13JF1	6	23JAE
10	49AH1	8	13AJ1	7	14AC1	6	23JQN
10	49AM1	8	14CF1	7	14CA1	6	23JQ0
10	51DA1	8	14FB1	7	14CCA	6	23KQQ
10	52BH1	8	23B	7	14C00	6	23QTJ
10	52CJ1	8	23HAE	7	23A	6	23SQG
10	74AA1	8	23HAK	7	23HBF	6	41B00
10	74AEK	8	23KAF	7	23HQA	6	41M00
10	75CAG	8	23LQD	7	23JQR	6	41P00
10	75CF1	8	23MAC	7	23MT0	6	42EH1
10	75DBE	8	23QQS	7	23NQF	6	45AR1
9	11EAD	8	23QT0	7	23PQU	6	46CR1
9	11GAD	8	23SQH	7	23QQX	6	46CW1
9	11H00	8	41GA1	7	23QRG	6	46DT1
9	11JC1	8	41GN1	7	23SQK	6	46JAD
9	13CM1	8	41NAC	7	44DK1	6	46NE1
9	13CQ1	8	41PD1	7	44FH1	6	52AB1
9	13EK1	8	42C00	7	45BJA	6	71AA1
9	13EL1	8	42ED1	7	45BSA	6	71B00
9	13JC1	8	45AJA	7	45ED1	6	71O00
9	14BB1	8	45BN1	7	46FU1	6	74PM1
9	14BE1	8	45EBA	7	46HAG	6	74PP1
9	14EN1	8	46CS1	7	46HCE	6	75AK1
9	14GE1	8	46DB1	7	46JA1	6	75BEB
9	23QRD	8	46D00	7	46JG1	6	75CAF
9	23SQV	8	46HAF	7	46ND1	6	75GB1
9	41AJ1	8	47A00	7	52CG1	6	75GDB
9	41PC1	8	47BAP	7	52EB1	6	75GF1
9	45AN1	8	49AG1	7	71DG1	6	93AA1
9	45BD1	8	52A00	7	74AEM	6	93AR1
9	46CZ1	8	52CE1	7	74APC	5	11CH1
9	46FZ1	8	71BH1	7	74KN1	5	11DGA
9	46GH1	8	71CJ1	7	75AFA	5	11KG1
9	46JAF	8	74APF	7	75BAB	5	12AG1
9	49AAB	8	74AP4	7	75DC1	5	12BK1

Table 2-11. WUC Removal Frequencies — Non-Isochronal A/C, Cont.

FREQ	WUC	FREQ	WUC	FREQ	WUC	FREQ	WUC
5	12BZ4	5	74DZ1	4	45GA1	3	23HAC
5	13AAG	5	74FH1	4	45JA1	3	23JA0
5	13AB1	5	74GA1	4	45J00	3	23KQF
5	13ACD	5	74KU1	4	46AQ1	3	23KQL
5	13A00	5	75AH1	4	46GL1	3	23MA0
5	13BH1	5	75BCB	4	46HBA	3	23MR0
5	13CK1	5	75DBD	4	46HCD	3	23MVF
5	13EC1	5	75JBC	4	46HCH	3	23NQG
5	13GC1	5	75KAC	4	46JAC	3	23NQJ
5	13JE1	4	11EAC	4	46JB1	3	23PQK
5	14BC1	4	11EBA	4	46PC1	3	23PQL
5	14E00	4	11EBE	4	46P00	3	23QQK
5	23E	4	11E00	4	47AAD	3	23QQV
5	23JQP	4	11FAD	4	47BAA	3	23QSD
5	23J00	4	11FB0	4	47BAB	3	23SQP
5	23KQD	4	11GAE	4	47B00	3	23SQR
5	23PQC	4	11KC1	4	49A00	3	41D00
5	23PQS	4	11KE1	4	52D00	3	41EC1
5	23SRF	4	11LB1	4	71BE1	3	41E00
5	41AB1	4	12BZ2	4	74ANB	3	41GB1
5	41A00	4	12DC1	4	74AN6	3	41GG1
5	41CA1	4	13JJ1	4	74BCC	3	41GJ1
5	41CE1	4	14B00	4	74CAA	3	41LC1
5	41DD1	4	14CM1	4	74CP1	3	41NAD
5	41GK1	4	14D00	4	74LC1	3	41NA1
5	41GM1	4	14GF1	4	75EAE	3	42FG1
5	41KC1	4	14GH1	4	75GFC	3	45AQ1
5	41KD1	4	23D	4	75JBB	3	45BU1
5	41KE1	4	23HBE	4	75KBC	3	45CH1
5	41NAB	4	23JAB	4	93AH1	3	45D00
5	41NC0	4	23JQD	4	93AM1	3	45EEA
5	41ND0	4	23JQE	3	11DAD	3	45E00
5	42E00	4	23JQL	3	11DAF	3	45JRA
5	44O00	4	23KQJ	3	11DCD	3	46DV1
5	45BJ1	4	23MBA	3	11DFH	3	46FF1
5	45CG1	4	23MB0	3	11DF0	3	46F00
5	45JF1	4	23NQH	3	11DGD	3	46HCG
5	46G00	4	23PQH	3	11ECK	3	46JAA
5	46HCC	4	23PQN	3	11FCC	3	46JBB
5	46JAB	4	23QRA	3	11GAG	3	46JF1
5	46J00	4	23QSB	3	11JG1	3	46MC1
5	46KA1	4	23QS0	3	11LA1	3	46M00
5	46N00	4	23QTB	3	11LC1	3	46NB1
5	46PB1	4	23SQL	3	11LG1	3	47BAN
5	46SA1	4	23SRM	3	12AC1	3	49AD1
5	47AD1	4	41AK1	3	13AAB	3	49AJ1
5	47CB1	4	41LA1	3	13GH1	3	51D00
5	47O00	4	42AM1	3	14AG1	3	65BB1
5	51G00	4	42EE1	3	14GG1	3	71A00
5	71BF1	4	42FD1	3	14HC1	3	71CK1
5	74APJ	4	42FJ1	3	14JD1	3	71D00
5	74CG1	4	45GAA	3	14JN1	3	71GD1



Figure 2-28. WUC 14FA1 Removal Interval Distribution (Weeks)

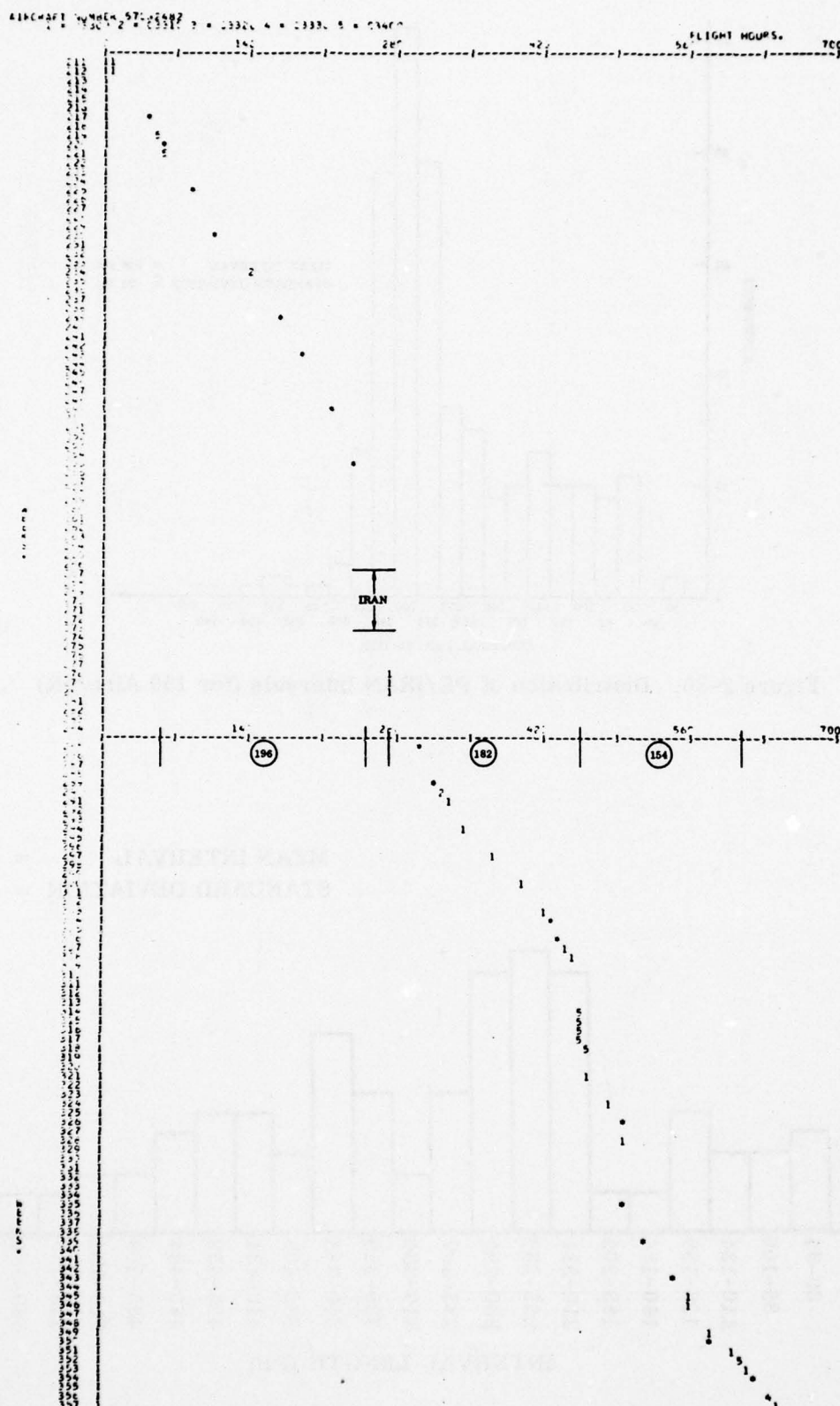


Figure 2-29. Inspection History for Serial No. 57002482

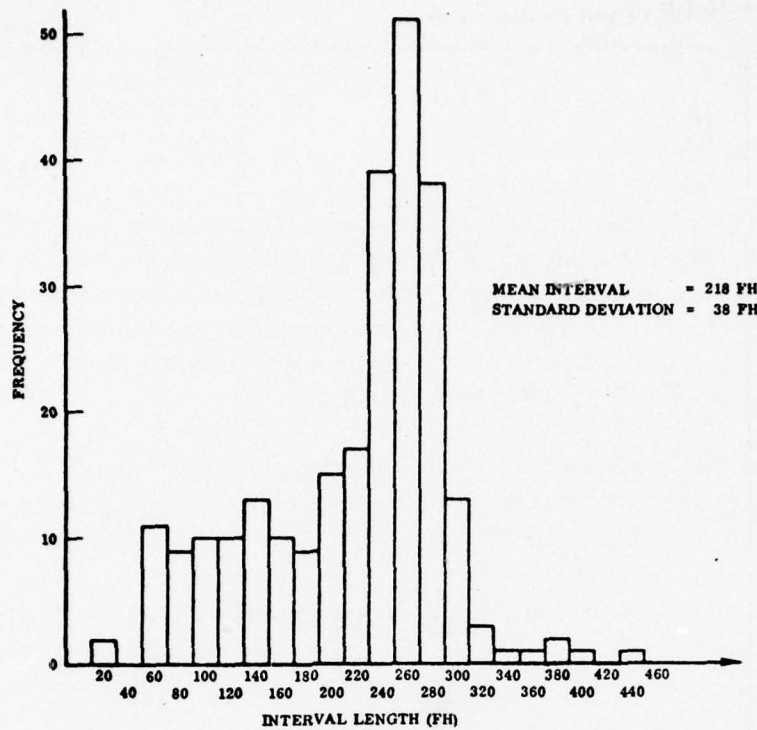


Figure 2-30. Distribution of PE/IRAN Intervals (for 150 Aircraft)

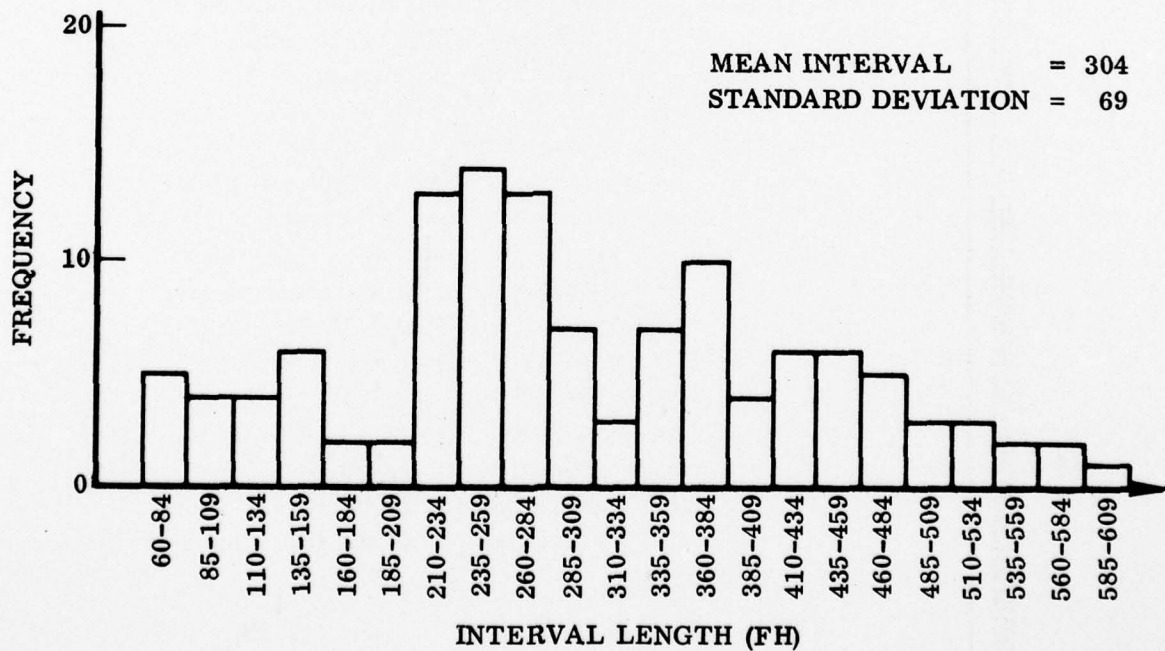


Figure 2-31. Distribution of Periodic Inspection Intervals Only (for 150 Aircraft)

2.7 EFFECTIVENESS ANALYSIS

The purpose of the effectiveness analysis is to predict the impact on aircraft availability and mission reliability of maintenance program variations in scheduled inspection package content and interval lengths. In the analysis the requirement to meet the flying hour program is treated as a constraint. That is, aircraft utilization is input to the effectiveness model along with the description of the alternative maintenance program. The model then calculates the effectiveness as a function of interval length over the maintenance program period. The maintenance program period is the time interval between occurrences of the major inspection of the maintenance program. In the current maintenance program this is the interval between the 600 FH periodic inspection, or about 600 FH. (See Figure 2-5.)

Aircraft availability is calculated by accumulating the NORM and NORS hours for the various inspection packages and those hours during the intervals between inspections over the maintenance program period.

Dependability, or mission reliability, is approximated by the probability of abort or of an accident, incident, or EUMR per sortie, which are the measures available through the data system. These are treated as functions of the type of preceding inspection package and the length of inspection interval.

Effectiveness, as the product of these factors, is the probability that an aircraft is operationally ready for a "failure-free" mission in the above sense of failures.

The effectiveness model also calculates the direct organizational maintenance man-hours required to support the maintenance program. This is the total of manhours expended in the various inspections and for unscheduled maintenance between inspections.

Additional costs to support the maintenance program are calculated by the economic analysis discussed in Section 2.8. These additional costs are the intermediate level maintenance manhours and the dollar costs of depot labor and spares.

NORM hours and maintenance manhours expended in scheduled inspections are calculated by a supporting submodel, the Network Analysis Model (NAM), which calculates the distribution of flow time and manhours for an inspection package. This is accomplished by developing a network describing the series and parallel organization of the various inspection tasks included in the inspection package. In addition, the distributions of manhours and task times required to carry out the scheduled inspection tasks on the various work unit code sets associated with the network branches are input to NAM. The model then calculates the distributions of the flow time across the network and the total manhours involved.

The manhours and NORM hours for the various inspection packages, along with maintenance action frequencies and NORM and manhours distributions for unscheduled maintenance, are then input to the Effectiveness Model to calculate total manhours, availability, dependability, and effectiveness for the maintenance program alternative.

2.7.1 NETWORK ANALYSIS MODEL DESCRIPTION. The Network Analysis Model (NAM) was developed to determine the impact of changes in the inspection tasks on the flow time for inspection packages. The inspection package is represented by a network of series and parallel branches, each of which represents a task or set of tasks, as shown schematically in Figure 2-32.

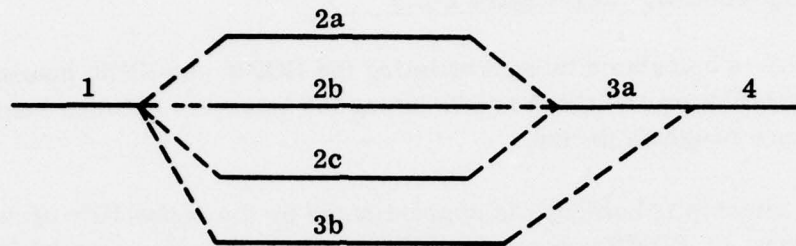


Figure 2-32. Inspection Package Network

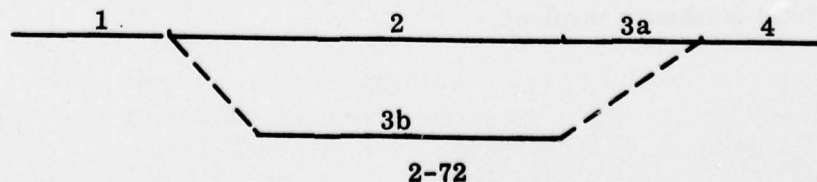
Calculation of the flowtime distribution involves reducing the network to a single equivalent branch by combining sets of parallel branches and sets of series branches, and replacing them in the network by equivalent branches.

The reduction of sets of branches to equivalent branches involves the application of two different mathematical techniques. For two branches in series, the probability distribution for the total span time is the distribution for the sum of the span times. This distribution is obtained as the convolution of the individual distributions. For branches in parallel, the span time is the distribution for the maximum over the branches.

For example, in the above network, the span time across branches 2a, 2b, and 2c is

$$\begin{aligned}
 P_r \{t_2 \leq t\} &= P_r \{ \text{Max} (t_{2a}, t_{2b}, t_{2c}) \leq t \} \\
 &= P_r \{ t_{2a} \leq t \text{ and } t_{2b} \leq t \text{ and } t_{2c} \leq t \} \\
 &= P_r \{ t_{2a} \leq t \} \cdot P_r \{ t_{2b} \leq t \} \cdot P_r \{ t_{2c} \leq t \}.
 \end{aligned}$$

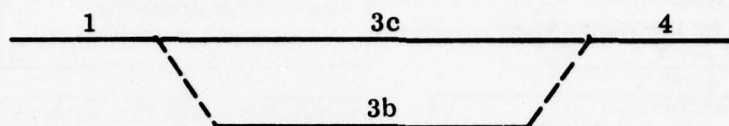
The network is now replaced by the following equivalent network.



Series branches 2 and 3a are reduced to an equivalent branch 3c by calculating the convolution

$$P_r \{ t_{3c} \leq t \} = P_r \{ t_2 \leq t \} * P_r \{ t_{3a} \leq t \} ,$$

and the network is now replaced by the following equivalent network.



Parallel branches 3c and 3b are reduced to equivalent branches 3 by calculating the product distribution

$$P_r \{ t_{3c} \leq t \} \cdot P_r \{ t_{3b} \leq t \} .$$

The final step in the reduction process involves calculating the convolution for series branches 1, 3, and 4.

The span times for the branches are stochastic variables whose probability distributions must, in general, be estimated. This applies to current inspection tasks as well as to any new tasks that may be proposed for a new maintenance program. The reason for this is that empirical data for individual look phase tasks is not available through the data systems. Estimates are available from the inspection work cards, but these data are of uncertain validity.

These estimates are adjusted by the initial application of NAM. This is accomplished by comparing the flow time predicted using the model to the total flow time for the inspection package obtained from the data bank. As a result of this evaluation, task span time estimates are available for the evaluation of new inspection packages.

The flow chart in Figure 2-33 describes the network analysis process. Three types of input data are required. The first consists of the empirical look phase manhours and inspection package NORM hours in step 1 of the block diagram. These data are input for existing inspection packages only, of course. In step 2 the branch data are read in. These data include the probability distributions for branch manhours and the span time to manhour ratios, FHR. The third set of input data in step 3 defines the network structure.

If an existing inspection package is being evaluated in order to scale inspection task manhours and man times, a "Yes" exit is taken at step 5. If previously adjusted data

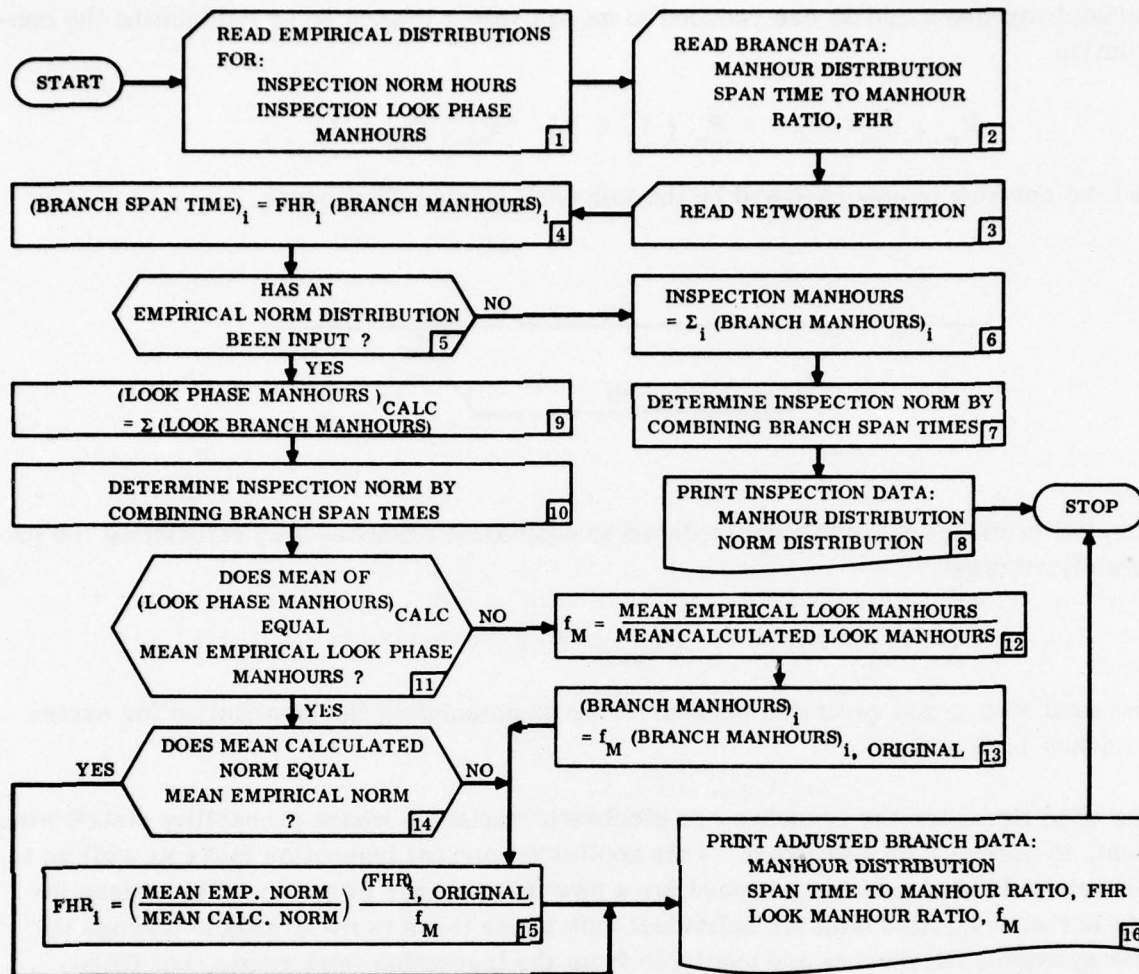


Figure 2-33. Network Analysis Model

is being used to predict flowtime and manhours for a new inspection package, a "No" exit is taken at step 5 and inspection package manhours are accumulated at step 6, followed by application of NAM to reduce the network at step 7 to calculate the package flow time.

Inspection task manhours and span times are scaled in steps 9 through 15 by calculating inspection package manhours in step 9, reducing the network by using NAM to calculate the flow time in step 10 and comparing calculated manhours with empirical manhours in step 11. The ratio, f_M , of empirical look manhours to calculated look manhours is adjusted in step 12. Branch manhours are adjusted in step 13. When package manhours equality is achieved in step 11, calculated package NORM hours are compared with empirically derived NORM hours in step 14, and the spantime-to-manhour ratio, FHR, is calculated in step 15.

When equality is achieved between empirically derived inspection package flow time and calculated flow time, the analysis of the inspection package is complete. At this point, NAM outputs the final values of the ratios f_M and FHR so that the adjusted values of task manhours and span times are available for evaluation of a new inspection package.

2.7.2 EFFECTIVENESS MODEL DESCRIPTION. The basic approach of the effectiveness model is to calculate the values of certain measures that describe the impact of the maintenance program by a process of summation starting at the WUC set level.

A general flow chart of the effectiveness model is shown in Figure 2-34. Calculations made by the model fall naturally into four major groupings. The first consists of those at the Inspection Task/WUC set level; results of these calculations are combined in the second step to produce aircraft-level values. The third step consists of those calculations pertaining to two consecutive inspection packages and the intervening interval, ΔI . At this level, total NORS, availability, dependability, manhours, and effectiveness are evaluated parametrically as functions of inspection package type and interval length, ΔI . The final step consists of combining the results obtained in the third step to produce total manhours, NOR hours, availability, and effectiveness for the maintenance program period.

In Figure 2-34 the various input values are represented by the blocks with dashed outlines.

Unscheduled maintenance is described by data input in blocks 1, 2, and 3. This includes the number of manhours per unscheduled maintenance action for each WUC set, the number of unscheduled maintenance actions per unit time for a WUC set versus time after the inspection package, and the number of NORM hours per unscheduled maintenance action for each WUC set.

In block 4, the manhour distributions for preflight and basic postflight inspections are input. The total manhours for these inspections during ΔI are calculated using these data and the frequencies for these inspections as determined from the aircraft utilization specified in block 5.

The special inspections are described in blocks 6 and 7 in terms of the manhours and NORM hours per inspection and inspection intervals.

NORS hours per week for each work unit code set are input in block 8.

Operational data on which a measure of dependability can be based is input in blocks 9 and 10. These data include the number of aborts per sortie following the different types of inspection packages at the WUC set level and the number of AIEs (accidents, incidents, and EUMRs) per sortie at the aircraft level.

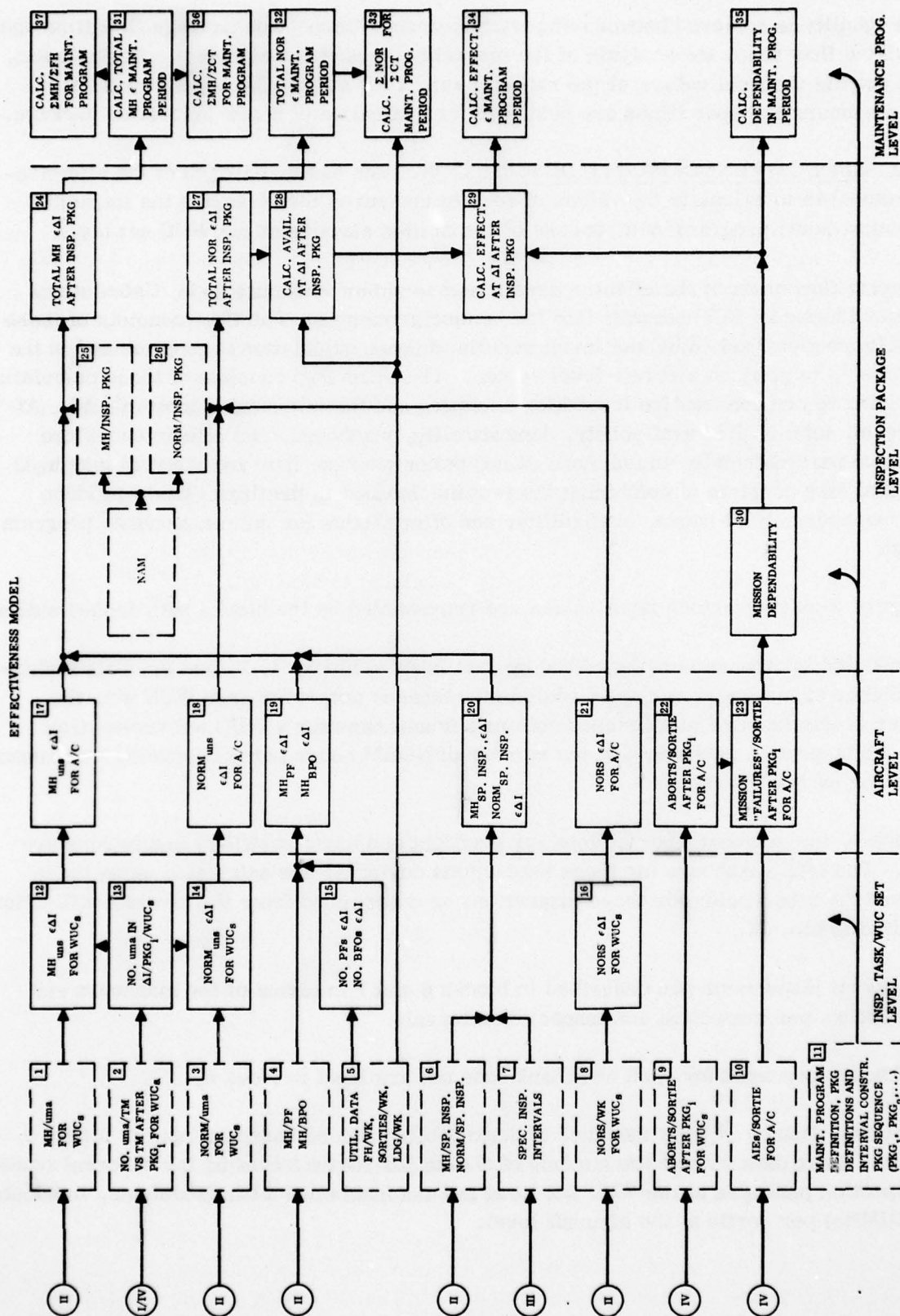


Figure 2-34. Effectiveness Model

Additional data describing the maintenance program, such as the inspection package sequence and constraints on the variability of ΔI , are input in block 11. The distributions of manhours and NORM hours per inspection package, as calculated by NAM, are input in blocks 25 and 26.

The effectiveness analysis procedure consists of the four major analysis steps described above.

At the inspection task and WUC set level, the distributions for the numbers of manhours and NORM hours during ΔI for each WUC set are calculated in blocks 12 and 14. This is accomplished by computing the expected number of unscheduled maintenance actions during ΔI for each WUC set following the different types of inspection packages in block 13 of Figure 3-34, and combining them with the manhours and NORM hours rates.

To calculate preflight and basic postflight inspection manhours, the distribution of the number of sorties during ΔI is calculated from the utilization data in block 5. This results in an estimate for the distribution of the number of basic postflight inspections during ΔI and, using a derived ratio, r , for the number of preflights per postflight, an estimate for the distribution of the number of preflights per ΔI in block 15. Combining these results with the input inspection manhours, the distribution of the number of preflight and basic postflight manhours is calculated in block 19.

The NORS hours during ΔI , by WUC set, are calculated in block 16 using the rates input in block 8.

At the aircraft level, the second step in the effectiveness analysis, the following calculations are made:

Unscheduled maintenance manhours and NORM hours during ΔI for the various work unit code sets are aggregated to obtain the distributions for these parameters at the aircraft level in terms of their mean and standard deviations.

The distribution for the number of special inspections during ΔI is obtained from the interval distribution for each type of inspection. Manhours and NORM hours for each type of special inspection during ΔI are then calculated in block 20 from the input manhours and NORM hours per inspection.

In block 22, the aborts/sortie rates following different types of inspections are calculated for the total aircraft by summing the rates for the various WUC sets.

The aircraft abort rate is combined with the AIEs/sortie rate in block 23 to obtain a mission "failures" per sortie rate following the different types of inspections.

In the third step in the effectiveness model, as described in Figure 2-34, parametric results for the several variables for two consecutive inspection packages and the intervening interval are obtained as functions of ΔI . These results are the basic building blocks for the evaluation of the total maintenance program depicted in Figure 2-32.

The following calculations are included in this step: The distribution of the total man-hours during ΔI following a given type of inspection package is calculated in block 24 of Figure 2-34 by determining the distribution for the total of unscheduled maintenance manhours in ΔI , preflight and basic postflight manhours in ΔI , special inspection manhours in ΔI , and manhours in the following scheduled inspection.

The distribution for the total NOR hours during ΔI and the subsequent scheduled inspection is calculated in a similar way in block 27 of Figure 2-34, by determining the distribution for the total of the unscheduled NORM hours in ΔI , the special inspection NORM hours in ΔI , the total NORS hours in ΔI , and the NORM hours in the subsequent scheduled inspection.

From the utilization data input in block 5, the distribution of the length of ΔI in calendar time when ΔI is expressed in terms of one of the other three time bases — flying hours, sorties, and landings — is calculated. This parameter is required in order to calculate the distribution of availability in block 28. Availability is the fraction of the time the aircraft is operationally ready, that is,

$$A_V = 1 - \frac{\Sigma \text{NOR}}{\Sigma \text{CT}} ,$$

where ΣCT is accumulated calendar time. This measure is calculated as a function of ΔI in block 28.

From the mission "failure" rate (F/S/A) calculated in block 23, the dependability parameter is calculated in block 30. This is the probability that a mission "failure," that is, an abort or AIE, will not occur during the sortie. That is,

$$D = \exp (- F/S/A).$$

Effectiveness as a function of ΔI for two consecutive inspection packages and the intervening interval is evaluated at block 29. This consists of determining the probability distribution of the product of availability and dependability.

In the fourth and final step of the effectiveness analysis, the distribution of the total manhours across the maintenance program is determined as a function of ΔI in block 31. The NOR hours versus ΔI distributions for the consecutive packages are the basis for determining the NOR hours for the maintenance program as a function of ΔI in block 32.

Distributions for total calendar time (CT) for the maintenance program period are calculated and used to calculate distributions for the manhours per unit time in block 36, manhours per flight hour in block 37, and NOR hours per unit time in block 33.

Dependability during the maintenance program is calculated as a function of ΔI in block 35, and the distribution of effectiveness as a function of ΔI is calculated in block 34.

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A detailed flow chart of the effectiveness model is given in Figure 2-35. In the following discussion the equations for the various steps in the analysis are derived. Definitions of the different parameters and variables in the model are given first.

The parameters which define the maintenance program and major inspections are input in blocks 1 and 2 of Figure 2-35. These are:

DELI — The basic inspection interval length, ΔI .

KI — An integer specifying the time base for ΔI , $KI = 1, 2, 3, 4$ for ΔI in weeks, flight hours, sorties and landings, respectively.

NSCT — The number of different types of scheduled inspection packages.

NFOL(I) — The number of types of scheduled inspection packages that can occur at the end of the interval ΔI (DELI) following an inspection package of type I.

NSCH(I, U) — The number of intervals that begin with a type I inspection package and end with a type J.

EMHI (I, J) — The mean manhours for inspection package type J when it follows inspection package type I in block 2.

AN (I, J), BN (I, J) — The coefficients of the linear regression function in block 2 for the NORM hours in inspection package J versus time after the preceding inspection package I. That is, $\overline{NORM}/IN (I, J) = AN(I, J) + BN(I, J) \cdot t_{AFTER I}$.

SMHI(I, J) — The standard deviation of the manhours per inspection package J following inspection package I.

SNI (I, J) — The standard deviation of the NORM hours in inspection package J following inspection package I.

NI — The number of values of ΔI (DELI) to be used in the parametric evaluation.

Each pair of values I and J above identifies a different type of inspection interval. The total number (NINT) of inspection intervals is then given by

$$NINT = \sum_{I=1}^{NSCT} \sum_{J=1}^{NFOL(I)} NSCH(I, J),$$

and the length of the maintenance program period not counting inspection flow times is

$$NINT \cdot \Delta I.$$

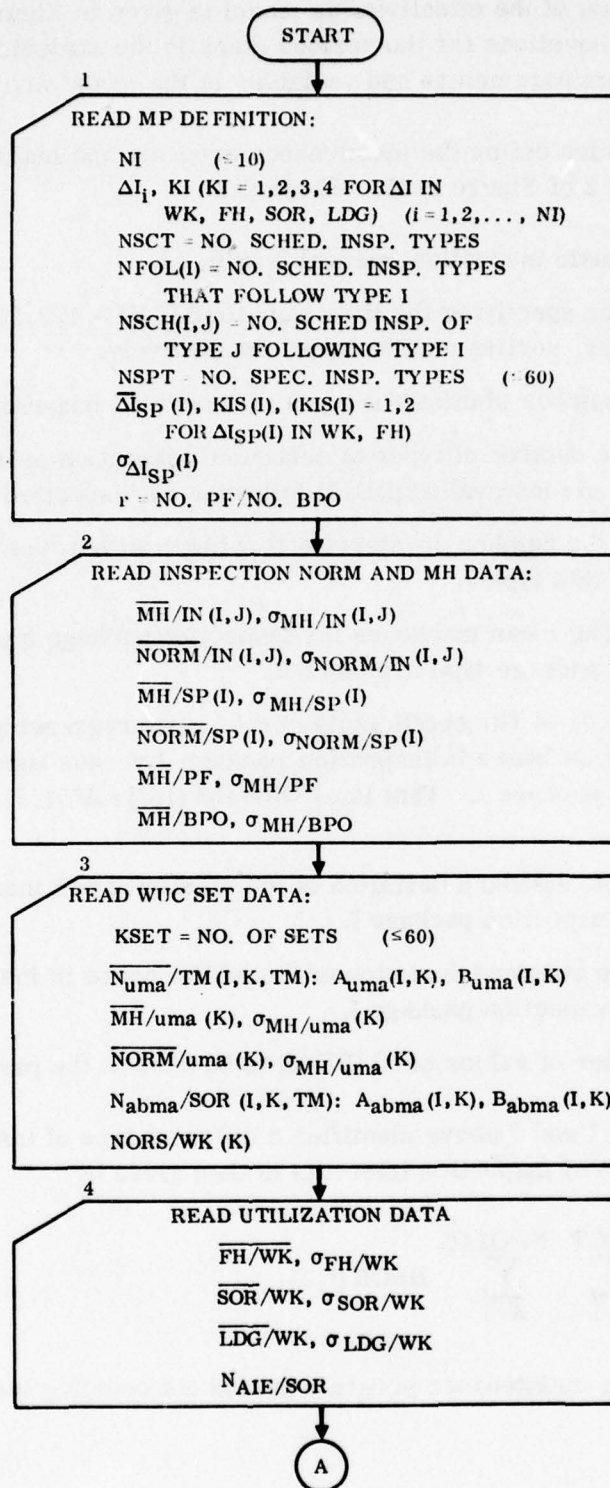


Figure 2-35. Detailed Effectiveness Model (Sheet 1)

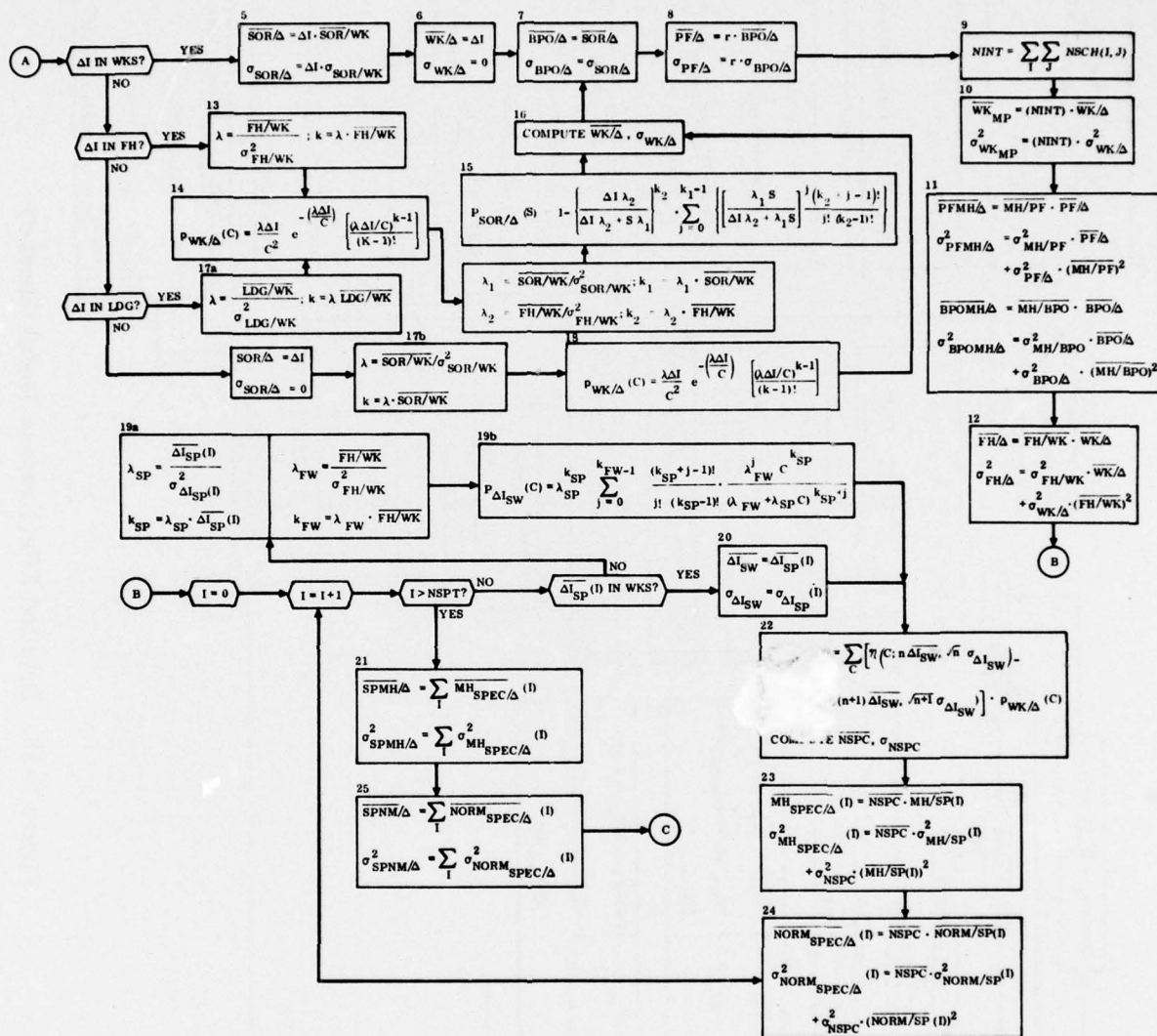


Figure 2-35. Detailed Effectiveness Model (Sheet 2)

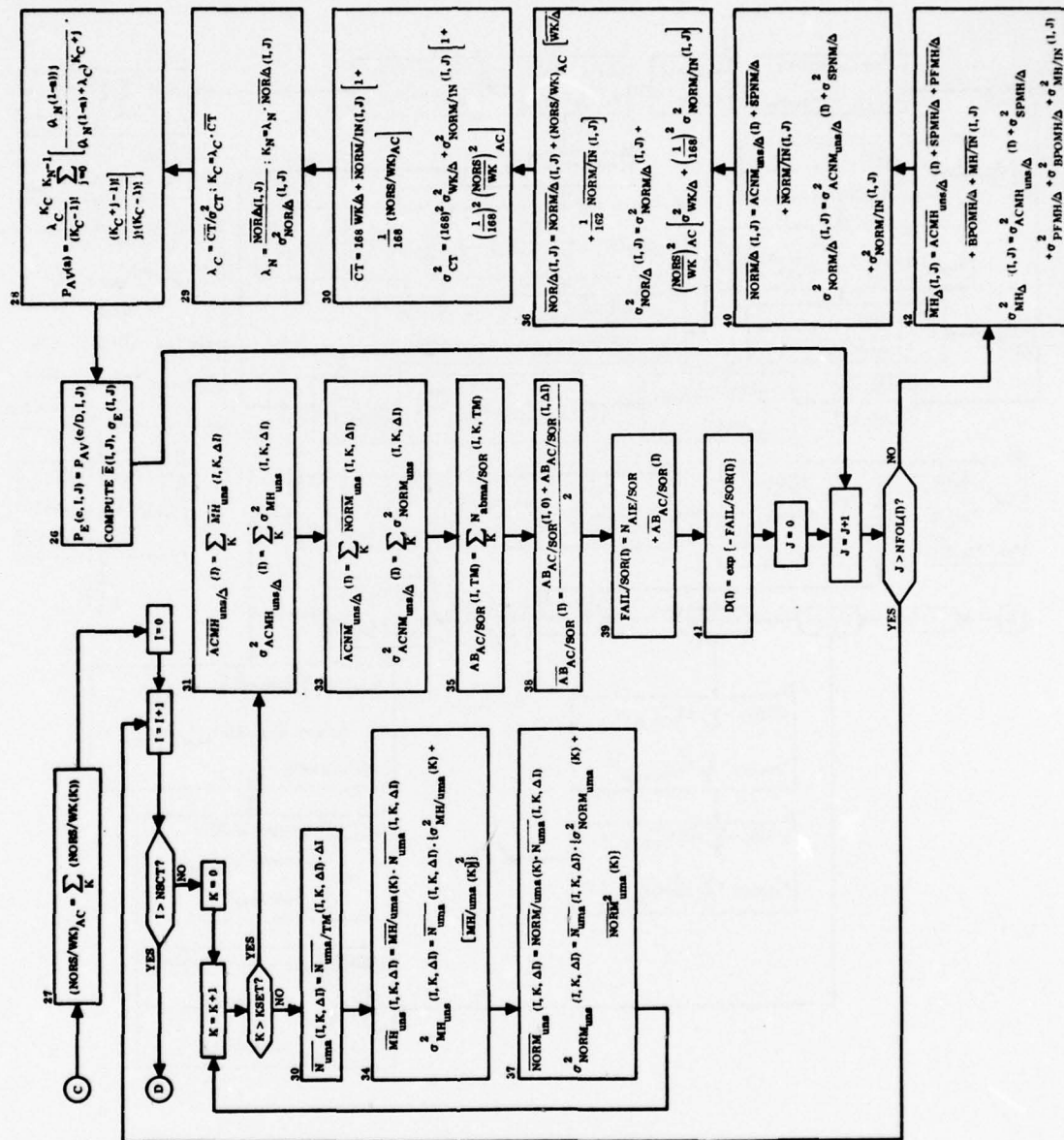


Figure 2-35. Detailed Effectiveness Model (Sheet 3)

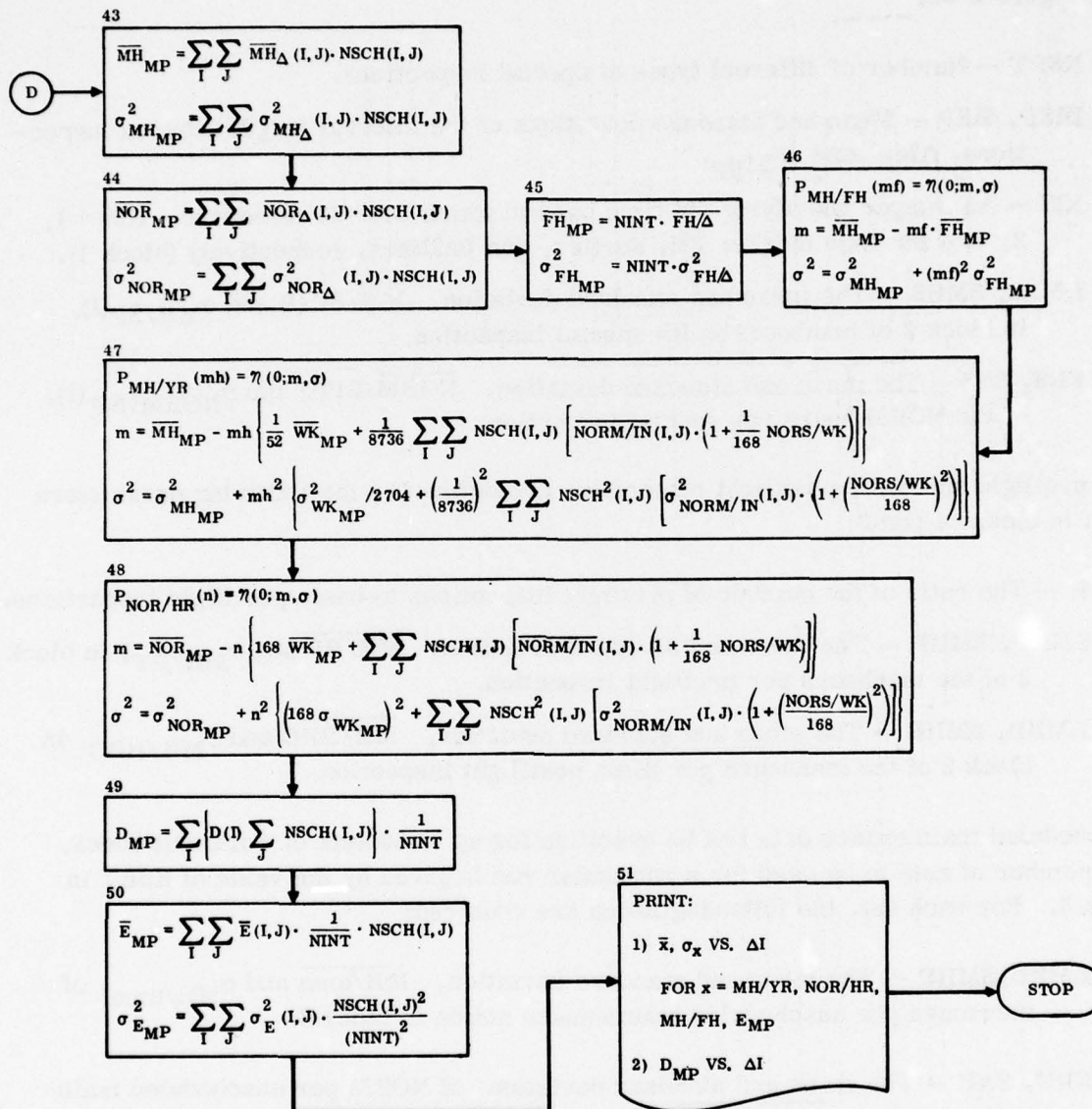


Figure 2-35. Detailed Effectiveness Model (Sheet 4)

The linear regression function for NORM hours per inspection package is input for inspection packages retained from the current program. For new inspection packages, the Network Analysis Model provides the needed data.

Special inspections are described by the following parameters included in blocks 1 and 2 of Figure 2-35.

NSPT — Number of different types of special inspections.

DISP, SISP — Mean and standard deviations of the interval length between inspections, ΔI_{SP} and $\sigma_{\Delta I_{SP}}$.

KIS — An integer specifying the time base in which DISP is measured. KIS = 1, 2, 3, 4 for time in wks, FH, sorties, and landings, respectively (block 1).

EMHS, SMHS — The mean and standard deviation, $\overline{MH/SP(I)}$ and $\sigma_{MH/SP(I)}$, in block 2 of manhours in Ith special inspection.

ENS, SNS — The mean and standard deviation, $\overline{NORM/SP(I)}$ and $\sigma_{NORM/SP(I)}$, of the NORM hours per special inspection.

The preflight and basic postflight inspections are defined by the following parameters input in blocks 1 and 2:

R — The ratio of the number of preflight inspections to basic postflight inspections.

EMHP, SMHP — The mean and standard deviation, $\overline{MH/PF}$ and $\sigma_{MH/PF}$, in block 2 of the manhours per preflight inspection.

EMHB, SMHB — The mean and standard deviation, $\overline{MH/BPO}$ and $\sigma_{MH/BPO}$, in block 2 of the manhours per basic postflight inspection.

Unscheduled maintenance data can be specified for up to 60 sets of work unit codes. The number of sets to be used for a particular run is given by the value of KSET in block 3. For each set, the following items are required:

EMHU, SMHU — The mean and standard deviation, $\overline{MH/uma}$ and $\sigma_{MH/uma}$, of manhours per unscheduled maintenance action in block 3.

ENU, SNU — The mean and standard deviation of NORM per unscheduled maintenance action, $\overline{NORM/uma}$ and $\sigma_{NORM/uma}$, in block 3.

ANU, BNU — The coefficients of the linear regression function for the number of unscheduled maintenance actions, $\overline{N_{uma}}$, per unit time versus time after the inspection in block 3: $\overline{N_{uma}} = ANU(I, K) + BNU(I, K) \cdot (t)_{\text{after } I}$, for the Kth work unit code set and Ith inspection type.

UMAS — The minimum value of $\overline{N_{uma}}$.

DIK — Input as 1.0 when $t_{\text{AFTER } I}$ is to be measured from the inspection at the beginning of the interval, and as 3.0 when $t_{\text{AFTER } I}$ is to be measured from the inspection at the start of the preceding interval.

ANAB, BNAB — The coefficients of the linear regression function for the number of abort maintenance actions per sortie versus time after inspection package I for the Kth work unit code set in block 3: $N_{\text{abort}} = \text{ANAB}(I, K) + \text{BNAB}(I, K) \cdot (t)_{\text{after } I}$

ENWK — The mean number of NORS hours per week charged to the set.

This input data is obtained from the corresponding data generated by the statistical analyses for all the work unit codes included in the set. This is accomplished by a simple summation process except for manhours and NORM hours per maintenance action. These are obtained as weighted averages:

$$\text{EMHU}(K) = \sum_{i=1}^N n_i (\overline{\text{MH}/\text{uma}})_i / \sum_{i=1}^N n_i,$$

where

n_i is the number of unscheduled maintenance actions per unit time on work unit code i ,

$(\overline{\text{MH}/\text{uma}})_i$ is the mean number of manhours per unscheduled maintenance action on work unit code i , and

N is the number of work unit codes in set K .

and

$$\text{ENU}(K) = \sum_{i=1}^N n_i (\overline{\text{NORM}/\text{uma}})_i / \sum_{i=1}^N n_i,$$

where

$(\overline{\text{NORM}/\text{uma}})_i$ is the mean number of NORM hours per unscheduled maintenance action on work unit code i .

The standard deviations for manhours and NORM per unscheduled maintenance action are given by:

$$\text{SMHS}(K) = \sum_{i=1}^N \left\{ n_i \left[(\sigma_{\text{MH}/\text{uma}})_i^2 + ((\overline{\text{MH}/\text{uma}})_i - \text{EMHU}(K))^2 \right] \right\} / \sum_{i=1}^N n_i$$

and

$$SNS(K) = \sum_{i=1}^N \left\{ n_i \left[(\sigma_{NORM/uma}^2)_i^2 + ((\overline{NORM/uma})_i - ENU(K))^2 \right] \right\} / \sum_{i=1}^N n_i$$

where

$(\sigma_{MH/uma})_i$ and $(\sigma_{NORM/uma})_i$ are the standard deviations for work unit code 1.

The values of n_i for the current maintenance program are the numbers of unscheduled maintenance actions encountered in the data bank. The unscheduled manhour and NORM data for each WUC are obtained from the statistical analysis of MH and NORM hours per maintenance action.

Utilization is specified by the following parameters in block 4:

EFHW, SFHW — The mean and standard deviation of flight hours per week, $\overline{FH/WK}$ and $\sigma_{FH/WK}$.

ESOW, SSOW — The mean and standard deviation of sorties per week, $\overline{SOR/WK}$ and $\sigma_{SOR/WK}$.

ELDW, SLDW — The mean and standard deviation of landings per week, $\overline{LDG/WK}$ and $\sigma_{LDG/WK}$.

AIES — The number of accidents, incidents and EUMRs per sortie, $N_{AIE/SOR}$.

The appropriate values for the current program can be obtained from the analysis of the effect of time after an inspection. Each of these utilization variables is correlated with time after a periodic inspection. The values obtained from the regression lines at a time approximately half-way between periodics can be taken as mean values independent of time. The corresponding standard deviation is the standard deviation of the regression obtained from the regression analysis.

Other variables in the program used in the following discussion are:

A_v — Availability

CT/MP — Calendar time per maintenance period.

CT/ Δ — Calendar time per inspection interval.

D — Dependability

E — Effectiveness ($E = A_v \cdot D$)

FAIL/SOR — Number of failures (aborts, accidents, incidents, EURs) per sortie.

FH/ Δ — Flight hours per inspection interval.

MH/FH — Manhours per flight hour.

MH/MP — Manhours per maintenance program.

MH/YR — Manhours per year.

NOR/HR — NOR hours per clock hour.

NOR/ Δ — NOR hours per inspection interval.

NSPC — Number of special inspections in a scheduled inspection interval.

N_{uma}/TM — Number of unscheduled maintenance actions per unit time.

SOR/ Δ — Sorties per inspection interval.

WK/ Δ — Weeks per inspection interval.

ΔI_{SW} — Special inspection interval length in weeks.

Original plans for the effectiveness model called for extensive use of the normal distribution. Previous studies indicated that some of the variables input to the model, such as flight hours per week, are approximately normally distributed. In addition, since the model is based on a summation process, the central limit theorem allows the result to be expressed as a normal distribution. The mean and standard deviation for each calculated variable can thus be obtained directly from the means and standard deviations of the input variables. The model is therefore much less complicated than would have been required for processing of complete distributions for all variables.

During this study it became apparent that not all the input quantities could be assumed to be normally distributed. For example, many of the special inspection types have values for the mean number of manhours per inspection that are less than the corresponding standard deviations. Since the variable is non-negative, the distribution is skewed and some alternative to the normal distribution is required.

A number of theoretical distributions were tested for compatibility with the empirical data. The most suitable was found to be the Erlang distribution, given by

$$p(x) = \lambda^k x^{k-1} e^{-\lambda x} / (k-1)!,$$

where $\lambda = \bar{x} / \sigma_x^2$

and $k = (\bar{x} / \sigma_x)^2.$

The symbols \bar{x} and σ_x are used for the mean value and standard deviation of x , respectively. The notation $[a]$ is used in this section to denote the largest integer less than a .

The cumulative is given by

$$P(x) = 1 - e^{-\lambda x} \sum_{j=0}^{k-1} \{(\lambda x)^j / j!\}$$

This distribution will approximate the normal for appropriate values of k . In addition, it has the feature that

$$p(x) = 0 \text{ for } x \leq 0,$$

thus being more suitable than the normal for those cases in which the standard deviation is large compared to the mean. In order to obtain the most reasonable values of $p(x)$, the model interpolates between $p_1(x)$ based on k_1 and $p_2(x)$ based on k_2 , where $k_1 = [(\bar{x}/\sigma_x)^2]$ is equal to k in the preceding equations, and $k_2 = k_1 + 1$.

That is,

$$p(x) = p_1(x) + \{p_2(x) - p_1(x)\} \cdot \{\bar{x}^2/\sigma_x^2 - k_1\}.$$

Furthermore, whenever \bar{x}^2/σ_x^2 is less than 1.0, $p(x)$ is calculated using $k = 1$.

At point a in the flow chart, the distribution $P_{WK/\Delta}$ for ΔI in weeks is derived for the cases in which the time base for ΔI is flight hours, sorties, or landings. For ΔI input in flying hours, for example, we have

$$\begin{aligned} P_{WK/\Delta}(c) &= \Pr \left\{ \text{No. WKS } \in \Delta I \leq c \right\} \\ &= \Pr \left\{ \frac{WKS}{\Delta I} \leq \frac{c}{\Delta I} \right\} \\ &= \Pr \left\{ \frac{\Delta I}{WKS} \geq \frac{\Delta I}{c} \right\} = 1 - \Pr \left\{ \frac{\Delta I}{WKS} < \frac{\Delta I}{c} \right\} \\ &= 1 - \left\{ 1 - e^{-\lambda_{FW} \left(\frac{\Delta I}{c} \right)} \sum_{j=0}^{k-1} \left\{ (\lambda_{FW} \Delta I / c)^j / j! \right\} \right\} \\ &= e^{-\lambda_{FW} \left(\frac{\Delta I}{c} \right)} \sum_{j=0}^{k-1} \left\{ (\lambda_{FW} \Delta I / c)^j / j! \right\} \end{aligned}$$

where $\lambda_{FW} = (\overline{FH/WK}) / \sigma_{FH/WK}$

$$\text{and } k_{FW} = \left[(\overline{FH}/\overline{WK}) / \sigma_{FH/WK}^2 \right].$$

The model uses the corresponding density function, given by

$$p_{WK/\Delta}(c) = \frac{(\lambda_{FW} \Delta I / c^2) e^{-(\lambda_{FW} \Delta I / c)} (\lambda_{FW} \Delta I / c)^{k_{FW}-1}}{(k_{FW} - 1)!}$$

in blocks 14 and 18.

To determine the number of basic postflights and preflights, the number of sorties in ΔI must be determined. For ΔI in flying hours or landings, $p_{WK/\Delta}$ is first obtained as above and then the distribution for the number of sorties in ΔI is calculated in block 15. This involves the λ_{FW} and k_{FW} defined above and also

$$\lambda_{SW} = \overline{SOR}/\overline{WK} / \sigma_{SOR/WK}^2$$

$$\text{and } k_{SW} = \left[(\overline{SOR}/\overline{WK}) / \sigma_{SOR/WK}^2 \right].$$

The equation is obtained as follows:

$$\begin{aligned} P_{SOR/\Delta}(s) &= \Pr \left\{ \text{No. Sorties } \in \Delta I \leq s \right\} \\ &= \sum_c \Pr \left\{ \frac{\text{No. Sorties}}{c} \leq \frac{s}{c} \right\} \cdot \Pr \left\{ \text{WKS } \in \Delta I = c \right\} \\ &= \int_0^{\infty} P_{SOR/WK} \left(\frac{s}{c} \right) p_{WK/\Delta}(c) \\ &= \int_0^{\infty} \left\{ 1 - e^{-\lambda_{SW} s/c} \sum_{j=0}^{k_{SW}-1} \frac{(\lambda_{SW} s/c)^j}{j!} \right\} \lambda_{FW} \frac{\Delta I}{c^2} \\ &\quad \exp \left\{ -\lambda_{FW} \left(\frac{\Delta I}{c} \right) \right\} \frac{\lambda_{FW} \left(\frac{\Delta I}{c} \right)^{k_{FW}-1}}{(k_{FW}-1)!} dc. \end{aligned}$$

Carrying out the indicated integration the cumulative distribution for the number of sorties in ΔI is:

$$P_{\text{SOR}/\Delta}(s) = 1 - \left(\frac{\lambda_{\text{FW}}\Delta I}{\lambda_{\text{FW}}\Delta I + \lambda_{\text{SW}}s} \right)^{k_{\text{FW}}} \sum_{j=0}^{k_{\text{SW}}-1} \frac{(k_{\text{FW}}+j-1)!}{(k_{\text{FW}}-1)!} \frac{1}{j!} \left(\frac{\lambda_{\text{SW}}s}{\lambda_{\text{FW}}\Delta I + \lambda_{\text{SW}}s} \right)^j$$

If ΔI is in weeks to begin with, then the calculation is simply that of blocks 5 and 6.

The mean and standard deviations of the distribution for the number of basic postflights and preflights are then calculated in blocks 7 and 8.

The mean and standard deviations of the total number of weeks in the maintenance program period are then calculated in block 10.

The distributions for the number of preflight and basic postflight manhours in ΔI are calculated in block 11. The variance in this case is that of the sum of a variable number of terms and is obtained as follows:

For some variable Z defined to be

$$Z \equiv x_1 + x_2 + \dots + x_n$$

where x_i and n both are stochastic variables with x_i identically distributed, then Z has the probability distribution

$$p_Z(u) = \sum_{n=1}^{\infty} p_N(n) p^{*n}(u)$$

where $p_N(n)$ is the probability distribution for n and p^{*n} is the n th-fold convolution of $p(x)$, with $E(x) = \bar{x}$ and $\text{Var}(x) = \sigma^2$.

Then

$$\bar{Z} = E(Z) = \bar{n} \cdot \bar{x},$$

and

$$\begin{aligned} \text{Var}(Z) &= \int_0^{\infty} (u - \bar{Z})^2 p_Z(u) du \\ &= \int_0^{\infty} (u - \bar{Z})^2 \sum_n p_N(n) p^{*n}(u) du \\ &= \sum_n p_N(n) \int_0^{\infty} (u - \bar{Z})^2 p^{*n}(u) du \end{aligned}$$

$$\begin{aligned}
&= \sum_n p_N(n) E(u - \bar{Z})^2 = \sum_n p_N(n) E(u - n\bar{x} + n\bar{x} - \bar{Z})^2 \\
&= \sum_n p_N(n) E(u - \bar{u} + a)^2,
\end{aligned}$$

where

$$a = n\bar{x} - \bar{Z}, \text{ and } \bar{u} = n\bar{x}.$$

Since

$$(u - \bar{u} + a)^2 = (u - \bar{u})^2 + 2a(u - \bar{u}) + a^2,$$

we have

$$\begin{aligned}
E(u - \bar{u} + a)^2 &= E(u - \bar{u})^2 + 2a E(u - \bar{u}) + a^2 \\
&= \text{Var}(u) + a^2
\end{aligned}$$

Hence,

$$\begin{aligned}
\text{Var}(Z) &= \sum_n p_N(n) \left\{ \text{Var}\left(\sum_{i=1}^n x_i\right) + (n\bar{x} - \bar{Z})^2 \right\} \\
&= \sum_n p_N(n) \left\{ n\sigma^2 + (n\bar{x} - \bar{n}\bar{x})^2 \right\}.
\end{aligned}$$

This reduces to

$$\text{Var}(Z) = \bar{n} \sigma^2 + \sigma_n^2 \bar{x}^2.$$

Applying this result in block 11, we obtain the equations shown there for the variance of preflight and basic postflight manhours in ΔI . The same result is used for flight hours per interval, FH/Δ , in block 12.

At point B in the flow chart, the distributions of special inspection manhours and NORM hours in ΔI are derived.

The first step at block 19 is to obtain the distribution $P_{\Delta I_{SW}}$ for the special inspection interval ΔI_{SW} in weeks if the interval is specified in flying hours instead. This distribution is:

$$P_{\Delta I_{SW}}(c) = \frac{(\lambda_{SP})^{k_{SP}}}{(k_{SP}-1)!} \sum_{j=0}^{k_{FW}-1} \frac{\lambda_{FW}^j c^{k_{SP}}}{(\lambda_{FW} + \lambda_{SP} c)^{k_{SP}+j}} (k_{SP} + j - 1)!$$

where

$$\lambda_{CD} = \overline{CT/\Delta} / \sigma_{CT/\Delta}^2,$$

$$k_{CD} = \left[(\overline{CT/\Delta} / \sigma_{CT/\Delta})^2 \right],$$

$$\lambda_{SP} = \overline{\Delta I_{SP}} / \sigma_{\Delta I_{SP}}^2,$$

$$k_{SP} = (\overline{\Delta I_{SP}} / \sigma_{\Delta I_{SP}})^2$$

The next step is to determine the distribution for the number of special inspections of type I in ΔI , the inspection interval, in block 22 of the flow chart. This distribution is derived as follows:

$$\begin{aligned} p_{NSPC}(n) &= \Pr \{ \text{No. inspections in } \Delta I = n \} \\ &= \Pr \{ \text{No. inspections in } \Delta I < n+1 \} - \Pr \{ \text{No. inspections in } \Delta I < n \}. \end{aligned}$$

The two probability distributions on the right are derived by determining the probability that the total time for n or $n+1$ inspections exceeds ΔI ; that is,

$$\begin{aligned} \Pr \{ \text{No. inspections in } \Delta I < n \} &= \sum_c \Pr \left\{ \sum_{I=1}^n \Delta I_{SW}(I) > c \right\} \cdot \Pr \{ \Delta I = c \} \\ &= \sum_c \left\{ 1 - \Pr \left\{ \sum_{I=1}^n \Delta I_{SW}(I) \leq c \right\} \right\} \Pr \{ \Delta I = c \}. \end{aligned}$$

The first distribution on the right is the n -fold convolution of the distribution for $\Delta I_{SW}(I)$ which, as above, can be assumed normal. The second distribution on the right above is obtained from PWK/Δ . Hence,

$$\Pr \{ \text{No. inspections in } \Delta I < n \} = \sum_c \left\{ 1 - \eta(c; n\overline{\Delta I}_{SW}, \sqrt{n} \sigma_{\Delta I_{SW}}) \right\} PWK/\Delta(c).$$

where $\eta(c; \bar{x}, \sigma_x)$ denotes the normal distribution with mean \bar{x} and standard deviation σ_x evaluated at c .

Consequently, the distribution for the number of type I special inspections in ΔI is

$$P_{\text{NSPC}}(n) = \sum_c \left\{ \eta(c; n\bar{\Delta I}_{\text{SW}}, \sqrt{n} \sigma_{\Delta I_{\text{SW}}}) - \eta(c; (n+1)\bar{\Delta I}_{\text{SW}}, \sqrt{n+1} \sigma_{\Delta I_{\text{SW}}}) \right\} \\ \cdot P_{\text{WK}/\Delta}(c).$$

The distributions for the manhours and NORM hours for special inspections of type I in ΔI are calculated in blocks 23 and 24. In the equations given there, the cumulative normal is the distribution for the total in a sequence of n inspections. This is then multiplied by the probability that there are n inspections, $P_{\text{NSPC}}(n)$, and summed over all n .

After these calculations are completed for each type of special inspection, the distributions for the total manhours and NORM hours in all special inspections are calculated in blocks 21 and 25. This completes the evaluation of the special inspections.

At point C in the flow chart (Figure 2-35), the NORS hours per week rates for the work unit code sets are summed to obtain an aircraft level rate.

The next step is to calculate unscheduled maintenance manhours and NORM hours in ΔI . Starting at block 30, the expected number of unscheduled maintenance actions in ΔI for work unit code set K is calculated from the unscheduled maintenance action frequency $N_{\text{uma}}/\text{TM}(I, K, \text{TM})$. The expected number and variance of manhours and NORM hours in ΔI are given by equations similar to those used for preflight and basic postflight manhours. That is, in block 34, we have

$$\overline{\text{MH}}_{\text{uma}}(I, K, I) = \overline{\text{MH}/\text{uma}}(K) \cdot \bar{N}_{\text{uma}}(I, K, \Delta I)$$

For the variance, the equation is somewhat simplified, since the mean and variance of the number of unscheduled maintenance actions are equal; hence,

$$\sigma_{\text{MH}_{\text{uma}}}^2(I, K, \Delta I) = \bar{N}_{\text{uma}}(I, K, \Delta I) \left\{ \sigma_{\text{MH}/\text{uma}}^2(K) + (\overline{\text{MH}/\text{uma}}(K))^2 \right\}$$

In block 37, similar equations for unscheduled NORM hours are used.

In blocks 31 and 33 the distributions for total unscheduled manhours and NORM hours in ΔI are calculated by summing over the work unit code sets.

The aborts-per-sortie rate at the aircraft level is calculated in block 35 as a function of time (TM) after inspection package type I by summing the WUC set rates. Then the average rate in ΔI is calculated in block 38.

In block 39, an aircraft "failures" per sortie rate is calculated by adding the abort and AIE rates. From this rate, the dependability $D(I)$ following inspection package type I is calculated as the probability that a "failure" does not occur in the sortie:

$$D(I) = \exp \{- \text{FAIL}/\text{SOR}(I)\}.$$

where $\text{FAIL}/\text{SOR}(I)$ is the sum of the abort rate and the AIE rate.

In block 42, the distribution of total manhours in an inspection interval for consecutive inspection package types I and J is calculated by adding the means and variances of manhours for unscheduled maintenance, special inspections, preflight and postflight inspections, and inspection package manhours.

The distribution of total NORM hours in an I, J interval is calculated in a similar way in block 40. The derivation of the distribution of total NOR hours in ΔI is somewhat more complicated in that NORS depends on the total calendar time for the interval. So, in the equation for $\overline{\text{NOR}}/\Delta(I, J)$ in block 36, the total of weeks per ΔI and elapsed time for the inspection package is multiplied by the NORS/WK rate for the aircraft.

The distribution for the total calendar time in the interval, calculated in block 32, is similar in that the NORS hours accumulated during the inspection provides an additional term in the equations for CT/Δ and $\sigma_{\text{CT}/\Delta}^2$, the mean and variance for the number of weeks per interval.

The calculation of the distribution for availability, A_v , versus ΔI in block 28 is based on the distributions for CT/Δ and NOR/Δ :

$$P_{A_v}(a) = \Pr \{A_v \leq a\} = \Pr \left\{ 1 - \frac{\text{NOR}/\Delta}{\text{CT}/\Delta} \leq a \right\}.$$

with Erlang distributions for NOR/Δ and CT/Δ , we have:

$$P_{A_v}(a) = \frac{(\lambda_{CD})^{k_{CD}}}{(k_{CD}-1)!} \sum_{j=0}^{k_{ND}-1} \frac{(\lambda_{ND}(1-a))^j}{(\lambda_{ND}(1-a) + \lambda_{CD})^{k_{CD}+j}} (k_{CD}+j-1)!$$

The distribution for effectiveness, E , is easily obtained from this result since

$$E = A_v \cdot D(I)$$

and $D(I)$ is not a stochastic variable. Therefore, in block 26, we have

$$P_E(e, I, J) = \Pr\{E \leq e\} = \Pr\{A_V \cdot D(I) \leq e\}$$

$$= \Pr\{A_V \leq e/D(I)\} = P_{A_V}\left(\frac{e}{D(I)}, I, J\right).$$

At point D in Figure 2-35, the calculations described above are completed for all I, J values and results for the maintenance program period are obtained.

In block 43, the distribution for the total manhours in M. P. is calculated by summing the means and variances of the manhours in ΔI over all I and J.

The derivation of the distributions for manhours per year and per flight hour and NOR/HR in the maintenance program period is complicated by the need to add in the elapsed time for NORM and NORS to obtain the total calendar time. If these totals are represented by CT/MP in blocks 46, 47 and 48, then the distributions are obtained as follows: In block 47 we have

$$P_{MH/YR}(mh) = \Pr\{MH/YR \leq mh\} = \Pr\left\{\frac{MH/MP}{CT/MP} \leq mh\right\}$$

$$= \Pr\{MH/MP - (mh)(CT/MP) \leq 0\}.$$

The mean and variance of the expression in the brackets are

$$m = \overline{MH/MP} - (mh) \overline{CT/MP},$$

$$\sigma^2 = \sigma_{MH/MP}^2 + (mh)^2 \sigma_{CT/MP}^2,$$

where CT/MP is expressed in the chart in weeks per maintenance period, WK/MP.

The result is given by the cumulative normal

$$P_{MH/YR}(mh) = \eta(0; m, \sigma)$$

The distributions for MH/FH in block 46 and NOR/HR in block 48 are obtained in a similar fashion.

In blocks 49 and 50, dependability and effectiveness in M. P. as functions of ΔI are calculated as time averages over the maintenance program period.

As the last step in the program, the maintenance program parameters are output in block 51.

2.8 ECONOMIC ANALYSIS

The objective of the economic analysis in this study was to quantify the economic effects of changes to the F-106 maintenance program. The analysis considered changes caused by differences in organizational, intermediate, and depot activities, and was conducted at the individual work unit code (WUC) level. The WUCs analyzed were selected by the alternative maintenance program on the basis of number of malfunctions, type of malfunction, criticality of failure, and inspectability.

The sources of information used in the analysis included AFM66-1 data reports K051, SX6L, SX7L, SX8L, and the maintenance interval changes as defined by the alternate maintenance program.

2.8.1 APPROACH. The methodology used to calculate the cost differences associated with alternative maintenance program definitions is depicted in the flow diagram of Figure 2-36. Since the inputs to these cost calculations were determined by the difference between the old time change item (TCI) intervals and the new recommended TCI intervals, the answers represented increases or decreases from the current F-106 maintenance program cost. The maintenance requirements for a given work unit code (WUC) are expressed in terms of direct maintenance manhours for organizational and intermediate level repair activities, and in terms of dollars for the corresponding spare and repair parts (S&RP) consumed at these two levels of maintenance. Depot level activities, which include S&RP, condemnations, and repair labor, are expressed in terms of dollars as this data was available from the K051, SX8L reports. It was considered more appropriate to show the maintenance manhours as labor hours than to convert them to dollars, in order that their impact could be considered separately if desired.

The set of input data required for each WUC cost calculation was collected on a work sheet as shown in Figure 2-37. The data on these work sheets were obtained from the AFM 66-1 reports SX6L, SX7L, and SX8L. These actuals were then converted to average values (depot cost per unit repaired, etc.), and percentages reflecting the historical pattern of final destinations for each WUC (percent repaired at intermediate level, percent condemned at organizational level, percent found to have no defects, etc.) were calculated (Figure 2-38).

Time change item (TCI) requirements modifications based on the alternate maintenance program definition were obtained and the change in removal frequency determined. Work unit code 23SRK, for example, had an old TCI of 300 flight hours and a recommendation of 600 FH for this TCI in the new maintenance program. The change in removals per unit time input to the cost methodology was -0.00167 removal per flight hour $\times 5590$ flight hours per month, which was equal to -9.319 removals per fleet month. The TCI requirements based on fixed time intervals were input as removals per month for a 260-aircraft fleet.

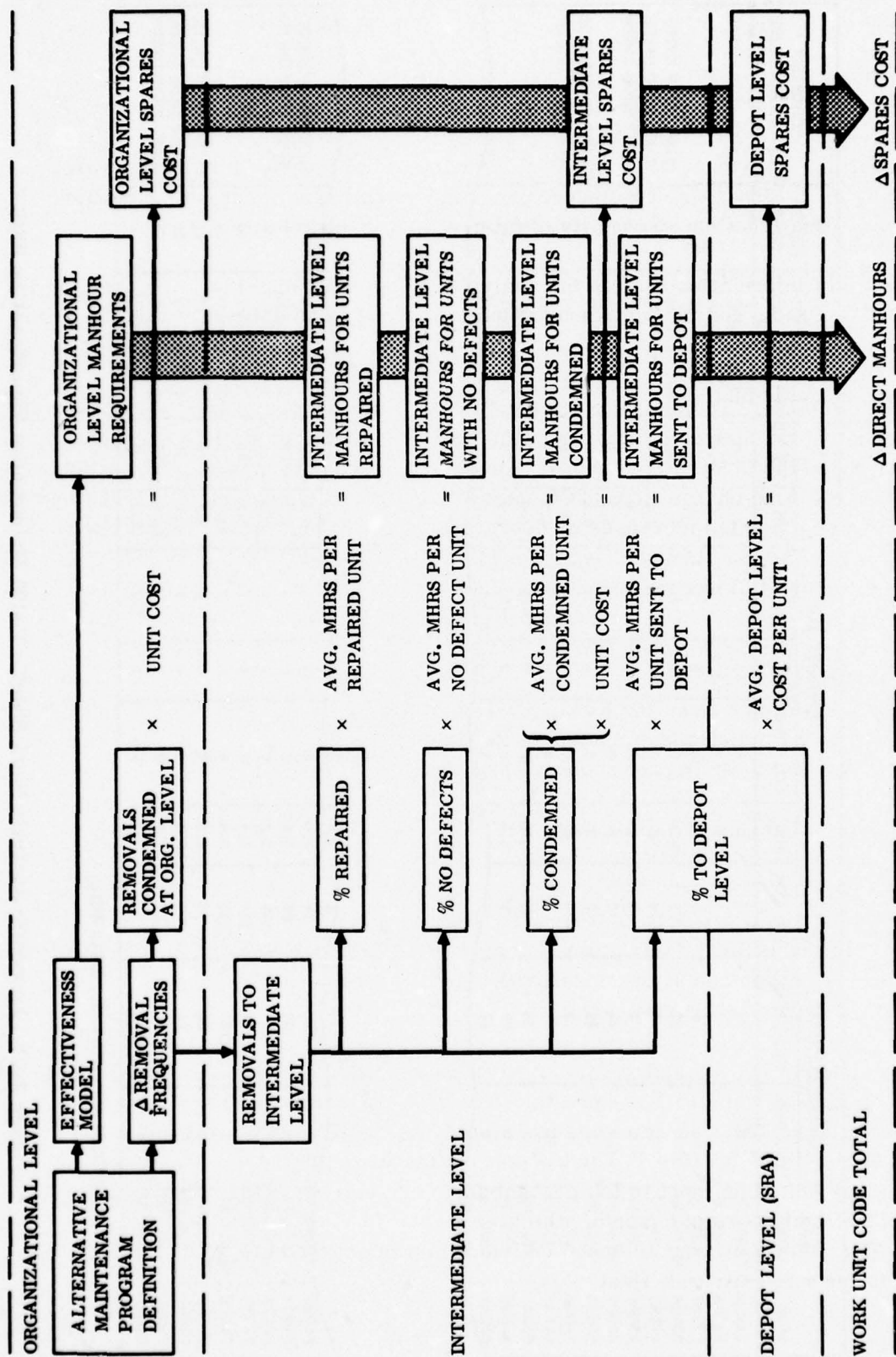


Figure 2-36. Economic Analysis Methodology Flow Diagram

ECONOMIC ANALYSIS WORK SHEET
F-106 MAINTENANCE EXPERIENCE BY WUC*

WUC	UNIT COST	ORGANIZATIONAL		INTERMEDIATE								DEPOT COST	% DEPOT COND.	APPARENT DATA PROBLEMS
		NO. COND.	NO. TO SHOP	NO. REP.	MH _R	NO. COND.	MH _C	NO. DEP.	MH _{ID}	NO. ND	MH _{ND}			
23NQA	1664.00	0	21	0	0	0	0	2	0.8	4	2.0	2011	5	LOST SHOP UNITS
23QSA	66.99	5	1	0	0	1	1.0	0	0	0	0	0	0	
23SQJ	136.00	44	0	0	0	0	0	0	0	0	0	32	0	
23SQA	11,350.00	0	62	3	25.0	0	0	22	7.0	1	19.2	7186	1	LOST SHOP UNITS
23SRG	200.00	0	6	0	0	0	0	3	1.2	0	0	85	5	LOST SHOP UNITS
23SRK	200.00	0	5	0	0	0	0	2	1.0	0	0	279	3	LOST SHOP UNITS
41GH1	1000.00	0	43	0	0	0	0	43	1.3	0	0	200	3	LOST SHOP UNITS
41AC1	4150.00	0	45	0	0	0	0	21	1.0	0	0	2506	0	LOST SHOP UNITS
41DFA	539.00	0	9	0	0	0	0	0	0	0	0	0	0	
41FA1	155.00	50	1	0	0	0	0	1	1.1	0	0	0	0	
42DA1	4012.00	0	89	2	5.6	0	0	84	2.0	3	6.0	908	13	
42DB1	4012.00	0	57	1	5.0	0	0	53	2.0	3	3.8	1418	13	
42CA1	1500.00	0	66	5	0	0	0	65	1.5	0	0	1089	10	
	443.00													

74BQ1	2200.00	0	139	9	2.0	0	0	1	3.5	0	0	302	1	LOST SHOP UNITS
74HT1	1000.00	0	108	41	6.0	0	0	3	1.2	21	1.5	1143	1	LOST SHOP UNITS
74AT1	1390.00	0	236	83	5.5	0	0	7	6.9	34	2.2	688	0	
74DC1	5740.00	0	187	195	3.3	0	0	9	6.5	61	1.8	480	3	
74APZ	10,918.00	0	195	117	4.5	0	0	3	10.4	73	2.0	1224	4	
75EJ1	900.00	0	20	119	5.0	0	0	2	3.5	0	0	1679	11	LOST SHOP UNITS
75BE1	134.00	0	21	2	4.6	0	0	1	6.5	1	3.0	218	18	LOST SHOP UNITS
75G00	6200.00	0	81	57	7.4	0	0	3	14.6	20	10.8	79	1	LOST SHOP UNIT*
75K00	2000.00	0	103	0	8.0	0	0	103	2.4	0	0	716	1	
					0	0	0					300		

* BASED ON AFM 66-1 REPORTS SX6L, SX7L, SX8L.

Figure 2-37. Economic Analysis Work Sheet - F-106 Maintenance Experience by WUC

ECONOMIC ANALYSIS WORK SHEET
 CONVERTED F-106 MAINTENANCE EXPERIENCE

WUC	UNIT COST	ORGANIZATIONAL		INTERMEDIATE							DEPOT REPAIR COST/UNIT	
		% COND.	% TO SHOP	% REP.	MH R	% COND.	MH COND	% DEPOT	MH ID	% N. D.	MH ND	
23NQA	1664	0	100	0	0	0	0	33	0.8	67	2.0	1005
23QSA	67	83	17	0	0	100	1.0	0	0	0	0	0
23SQJ	136	100	0	0	0	0	0	0	0	0	0	0
23SQA	11,350	0	100	11	25.0	0	0	84	7.0	5	19.2	327
23SRG	200	0	100	0	0	0	0	100	1.2	0	0	30
23SRK	200	0	100	0	0	0	0	100	1.0	0	0	140
41GHI	1000	0	100	0	0	0	0	100	1.3	0	0	5
41ACI	4150	0	100	0	0	0	0	100	1.0	0	0	120
41DFA	539	0	100	0	0	0	0	0	0	0	0	0
41FAI	155	98	2	0	0	0	0	100	1.1	0	0	0
42DA1	4012	0	100	2	5.6	0	0	95	2.0	3	6.0	11
42DBI	2500	0	100	2	5.0	0	0	93	2.0	5	3.8	27
42GAA	280	0	100	0	0	0	0	100	1.2	0	0	12

74DCI	5740	0	100	63	1.0	0	0	3	6.0	0	0	140
74APZ	10,919	0	100	61	5.0	0	0	2	10.4	37	2.0	555
75BJI	900	0	100	50	4.6	0	0	50	3.5	0	0	109
75BEI	134	0	100	33	7.4	0	0	34	6.5	33	3.0	79
75G00	6200	0	100	71	8.0	0	0	4	14.6	25	10.8	239
75K00	2000	0	100	0	0	0	0	100	2.4	0	0	7.5
97AA1	260	50	50	0	0	0	0	100	1.0	0	0	0

Figure 2-38. Economic Analysis Work Sheet - Converted F-106 Maintenance Experience

The following ground rules and assumptions apply to the results of the economic analysis:

- a. A vehicle fleet of 260 aircraft was assumed.
- b. An average of 21.5 flight hours per aircraft per month was assumed.
- c. Direct labor hours associated with organizational level repair activities other than scheduled removals are included in the effectiveness model calculations in Section 4.

2.8.2 RESULTS. Results of the economic analysis are shown in Table 2-12 for ten initial work unit codes. A number of maintenance activities (intermediate level units repaired, condemned, or found to have no defects) are blank for these work unit codes, apparently due to the nature of the data recorded in the AFM 66-1 reports used. The numbers of units reported (at the organizational level) as being sent for intermediate-level repairs were often unaccounted for in the intermediate level work categories. (Note, in Figure 2-37, the frequency of units reportedly sent to the shop but unaccounted for). The conspicuous absence of organizational and intermediate-level condemned units, which account for the S&RP costs at these levels, as well as intermediate-level repaired units, indicates that some deficiency in the documentation cycle is occurring regularly.

The results show that the new scheduled removal intervals for time change items will yield \$39,912 savings annually in spares and repair parts, and \$14,364 savings annually in intermediate and depot labor cost, or a total savings of \$54,300 annually.

Table 2-12. Economic Analysis Results

Work Unit Code	Old TCI Reqmt	Recomm. New TCI Reqmt.	WUC ΔRe-moval Rate removals/mo	Org. Level Direct Labor Δmh/mo.	Intermediate Level Direct Labor				Org. Level S&RP Δ\$/mo.	Int. Level S&RP Δ\$/mo.	Depot Level S&RP & Labor Δ\$/mo.	WUC	
					Units Repaired Δmh/mo.	Units With No Defects Δmh/mo.	Units Condemned Δmh/mo.	Units Sent to Depot Δmh/mo.				Total Labor Δmh/mo.	Total S&RP Δ\$/mo.
13DH1	12 mo.	delete	-24,696	Not Included	-0.2	0	0	-36.4	0	0	-66	-36.6	-66
14DA1	600 FH	400 FH	+ 4,656	This Report	0	0	0	+ 9.3	0	0	-396	.9	-396
14DB1	600 FH	400 FH	+ 4,656	Period	0	0	0	+ 8.4	0	0	-931	+8	-931
14DC1	600 FH	400 FH	+ 4,656		0	0	0	+ 8.4	0	0	-1863	-8	-1863
14FA1	600 FH	delete	-9,324		0	0	0	-14.7	0	0	-822	-15	-822
14HA1	600 FH or 2 yr.	600 FH	- 3,108		0	0	0	- 5.3	0	0	-2713	-5	-2713
23SRG	300 FH	delete	-18,638		0	0	0	-22.4	0	0	-560	-22	-560
23SRK	300 FH	600 FH	- 9,319		0	0	0	- 9.3	0	0	-1304	-9	-1304
47CD1	12 mo.	24 months	-10,833		0	0	0	- 9.8	0	0	-867	-10	-867
74LB1	100 FH	delete	-12,600		-2.7	-7.2	0	-49.7	0	0	-184	-60	-184
												-133	-3326

NOTE: Δ's shown represent changes for an entire fleet of 260 aircraft over a one-month period, assuming an average of 21.5 flight hours (FH) per aircraft per month.

SECTION 3

RECOMMENDED MAINTENANCE PROGRAM

The purpose of this section is to define the recommended maintenance program which resulted from the Phase III cost and effectiveness analysis studies. The cost and effectiveness methodology as well as the procedures for determining inspection content are given in Section 2.

Table 3-1 summarizes the current scheduled maintenance program and the recommended maintenance program.

Table 3-1. Maintenance Programs

Type Inspection	Existing Maintenance Program		Revised Maintenance Program	
	No. Requirements	Work Card MMH	No. Requirements	Work Card MMH
Preflight	113	3.5	84	2.1
Basic Postflight	143	5.3	120	4.5
Special	133	399.1	135	399.3
Inspection Prep	-	-	54	50.4
1st HPO	51	12.5	-	-
2nd HPO	19	25.1	-	-
3rd HPO	93	47.1	-	-
Minor Inspection	-	-	112	46.9
Periodic	599	343.5	-	-
Major Inspection	-	-	169	129.7
Corrosion	123	11.7	107	13.2
Engine Prep	-	-	69	103.9
Engine	128	95.9	144	73.1
Service/Lube	-	-	29	16.9
MA-1 - Minor	18	8.0	-	-
MA-1 - Major	50	27.6	50	27.6
IRAN	17	192.2	67	266.1

Appendix V contains the requirements details for each inspection in the recommended maintenance program. The intervals and predicted span times of the recommended maintenance program are summarized in Table 3-2.

Table 3-2. Revised Maintenance Program Intervals and Span Time

Inspection	Interval	Predicted Span Time
Preflight	1 per day	2 hr
Postflight	1 per flight*	2 hr
Special	As necessary	N/A
Minor	100 FH (Except as noted)	52 hr
Major	400 FH	299 hr
Corrosion	Included with IRAN	N/A
Engine	300 Eng. hours	35 hr
Service/Lube	As necessary	N/A
MA-1 Alignment	100 FH	16 hr
IRAN	48 months	55 days
*Inspection following final flight of day is more extensive		

The interval variation analysis conducted during Phase II showed a periodic inspection interval variation greater than 400 flight hours (approximately 440). Considering this variation, and because of the impact of a rigid interval control on the interval distribution, individual squadrons should be able to deviate from these recommended maintenance intervals by a factor of 10% to allow flexibility in scheduling and maintenance operations.

The MA-1 alignment requirement in the recommended maintenance program is conducted at 100 flight hours. This requirement is identical with the existing 90-day alignment workcards. The existing 45-day requirement has been deleted from the recommended maintenance program.

It should be noted that the work card manhours listed in Table 3-1 do not agree exactly with the times given in Section 4. This is due to the combination of certain inspection times for the Network Analysis Model and the variations between the card-time manhours and the usage-data manhours.

Also, the engine inspection parameters listed in Tables 3-1 and 3-2 are predicated on an engine replacement at each interval of 300 engine operating hours. This means that a spare engine would be installed in an aircraft whose engine has reached the 300-operating-hour limit in order to return the aircraft to operational status as soon as possible. The time-expired engine is then inspected and placed in the spares pool for the squadron.

Replacement of certain aircraft equipment after the accrual of a specified number of flying hours, equipment operating hours, or calendar time has been an accepted method of improving system reliability and safety. These replacement intervals have, in the past, been established through reliability analyses and then modified after experience is gained with the system.

The F-106 has been operated for a sufficient length of time to experience wearout failures on most safety-critical items. The time replacement schedule in T.O. 1F-106A-6 currently lists 48 types of equipment which must be replaced on a scheduled basis. Each of these items was subjected to an in-depth examination of available maintenance data.

In general, the findings were that the time replacement schedules were effective in preventing unscheduled failure of the equipment. In some cases the replacement intervals are so long (up to 5 years) that the data base could not show the results of extending the interval. However, the items listed in Table 3-3 were found to be either under or over-inspected. The data utilized in making the decisions listed in the table were taken from the Task I, Task III and Task V statistical analyses.

For example, WUC 13DH1, which is a brake valve, has a time replacement requirement of 12 months. Yet this item has a 29% infant mortality (29% of all failures occur in the first four flying hours) and the failure distribution indicates no evidence of wearout failures.

Conversely, WUCs 14DA1, 14DB1 and 14DC1, which are flight control valves, indicated that over 90% of the valves have been replaced by 450 flying hours; thus, the recommended interval of 400 flying hours. (A definite wearout trend is illustrated on the maintenance interval histograms for these items.)

Analysis of data on all of the items listed in Table 3-3 indicates that the recommended changes should be made for more economical (and more safe) operation of the F-106.

Table 3-3. Recommended Time Change Item Requirement Modification

Work Unit Code	Old TCI Requirement	Recommended New TCI Requirement	Analysis Remarks
13DH1	12 months	600 FH	Analysis reflects no wearout indication and 29% infant mortality. Recommend further study aimed at deleting this item from TCI requirement.
14DA1	600 FH	400 FH	} Analysis reflects wearout starting approximately 460 FH. Currently all units are changed prior to 500 FH.
14DB1	600 FH	400 FH	
14DC1	600 FH	400 FH	
14FA1	600 FH	900 FH	Analysis shows 46% infant mortality with no wearout. Recommend further study to eliminate this from TCI requirements.
14HA1	600 FH or 2 years	600 FH	Analysis shows time change at 450 FH based on 2-year requirement. No evidence of wearout.
23SRG	300 FH	600 FH	Infant mortality of 19% with no evidence of wearout. Recommend further study aimed at deleting this as a TCI requirement.
23SRK	300 FH	600 FH	No evidence of wearout. Recommend further study to delete this as a TCI requirement.
47CD1	12 months	2 years	Infant mortality of 42% with no indications of wearout failures.
74LB1	100 opr hrs	Delete	All units changed at intervals of less than 100 FH for unscheduled maintenance. No safety impact.

SECTION 4

EFFECTIVENESS ANALYSIS RESULTS

The effectiveness model described in Section 2 has been used to compare the recommended maintenance program with the current program. A description of the input data is presented herein, followed by an analysis of the results.

4.1 DESCRIPTION OF INPUT DATA

Much of the input data is the same for the current and alternative maintenance programs. The special inspections were assumed to be independent of the tasks or interval lengths of the scheduled inspections. Statistical analysis results provided data on 39 special inspections that have occurred with significant frequency. This data was input directly to the effectiveness model.

The intervals between special inspections were obtained from Task III. The manhours used were the look manhours per inspection from Task II. The manhours for repair actions resulting from special inspections would increase the manhour per inspection value by less than three percent, based on the repair action frequencies from Task I and the manhour-per-action results of Task II. These repair action manhours have therefore been neglected.

The same WUC set data was also taken to apply to both maintenance programs. The mean number of NORS hours per week was obtained from Task II. Task IV provided the number of unscheduled maintenance actions per unit time. Programming problems delayed the calculation of unscheduled maintenance actions per flight hour; therefore, the results of unscheduled maintenance actions per week were converted to actions per flight hour, using the mean value of flight hours per week as a conversion factor. These programming problems also delayed the calculation of aborts per sortie as a function of time after an inspection. The effectiveness model was therefore run with a constant abort per sortie rate based on the number of aborts obtained by Task I, the total number of flight hours in the period covered by the data bank, and the known ratio of sorties to flight hours. The mean and standard deviation of manhours and NORM hours per unscheduled maintenance action were obtained by combining the following output from Tasks I and II.

From Task I: The number of unscheduled maintenance actions on each WUC, by how malfunctioned code (HMC). This number can be denoted by $N_{uma}(\text{WUC}, \text{HMC})$.

From Task II:

- a. The mean $\left(\overline{\text{MH}/\text{ma}}(\text{WUC}, \text{HMC})\right)$ and variance $\left(\sigma^2_{\text{MH}/\text{ma}}(\text{WUC}, \text{HMC})\right)$ of manhours per maintenance action on each WUC, by HMC.

- b. The mean $(\overline{\text{NORM/ma}} (\text{WUC}))$ and variance $(\sigma^2_{\text{NORM/ma}} (\text{WUC}))$ of NORM per maintenance action on each WUC.

The computed values are:

- a. Mean manhours per unscheduled maintenance action.

$$\overline{\text{MH/uma}} = \frac{1}{N_1} \sum_{\text{WUC}} \left\{ \sum_{\text{HMC}} \left[\overline{\text{MH/ma}} (\text{WUC}, \text{HMC}) \cdot N_{\text{uma}} (\text{WUC}, \text{HMC}) \right] \right\}$$

$$\text{where } N_1 = \sum_{\text{WUC}} \sum_{\text{HMC}} n_{\text{uma}} (\text{WUC}, \text{HMC}).$$

- b. Variance of manhours per unscheduled maintenance action.

$$\sigma^2_{\text{MH/uma}} = \frac{1}{N_1} \sum_{\text{WUC}} \left\{ N_2 \cdot A^2 + \sum_{\text{HMC}} \left\{ N_{\text{uma}} (\text{WUC}, \text{HMC}) \cdot \left[\sigma^2_{\text{MH/ma}} (\text{WUC}, \text{HMC}) + B^2 \right] \right\} \right\}$$

$$\text{where } N_2 = \sum_{\text{HMC}} N_{\text{uma}} (\text{WUC}, \text{HMC}),$$

$$A = \frac{C}{N_2} - \overline{\text{MH/uma}},$$

$$B = \overline{\text{MH/ma}} (\text{WUC}, \text{HMC}) - \frac{C}{N_2},$$

$$\text{and } C = \sum_{\text{HMC}} \left[\overline{\text{MH/ma}} (\text{WUC}, \text{HMC}) \cdot N_{\text{uma}} (\text{WUC}, \text{HMC}) \right].$$

- c. Mean NORM per unscheduled maintenance action.

$$\overline{\text{NORM/uma}} = \frac{1}{N_1} \sum_{\text{WUC}} \left\{ N_2 \cdot \overline{\text{NORM/ma}} (\text{WUC}) \right\}.$$

- d. Variance of NORM per unscheduled maintenance action.

$$\sigma^2_{\text{NORM/uma}} = \frac{1}{N_1} \sum_{\text{WUC}} N_2 \left\{ \sigma^2_{\text{NORM/ma}} (\text{WUC}) + \left[\overline{\text{NORM/ma}} (\text{WUC}) - \overline{\text{NORM/uma}} \right]^2 \right\}.$$

Utilization was defined for the model by inputting values for flight hours per week and sorties per week obtained from Task IV. The input values of mean and standard deviation were those calculated directly from the observations of the dependent variables.

The AIE rate was input similarly as the mean value of the variable AIEs per sortie in Task IV.

The ratio of the number of preflight inspections to the number of basic postflight inspections also was assumed to be the same for both the current and alternative maintenance programs. It proved to be impossible to obtain a realistic value for this ratio from the statistical analyses, due to errors in the units-of-work field in the AFM66-1 data. A value of 0.79 was obtained from analysis of K-25 reports and used throughout this analysis.

The remaining input data includes the effects of defining alternative inspection packages as described in Section 3. The current maintenance program is defined for the effectiveness model as a series of five hourly postflight inspections followed by a periodic inspection. There is no distinction made between the 50-hour, 100-hour, and 150-hour postflights, or between the 300-hour and 600-hour periodics, since the AFM66-1 data upon which the analysis is based makes no such distinctions.

The network analysis model was used to generate mean manhour per inspection values including repair manhours for both the hourly and the periodic inspections.

Diagrams for a composite hourly postflight inspection and a periodic inspection are shown in Figures 2-7 and 2-8, respectively, and discussed in Section 2.4.

Since the MA-1 alignment interval is currently based on calendar time rather than flight hours, it was necessary to approximate this interval by the equivalent flight hour interval. It was therefore assumed that an MA-1 alignment is performed with each hourly and periodic inspection and also midway between each pair of these inspections. This is believed to produce nearly the same number of alignments per maintenance period as were actually performed during most of the period of time covered by the data bank, during which the alignments were scheduled every 30 days. The manhour-per-inspection data for the MA-1 alignments was obtained by combining the statistical analysis results for codes 03320 and 03330.

Only a very few maintenance actions (fix-phase actions) resulting from MA-1 inspections were found in the data bank. The manhours associated with these few actions are insignificant. Apparently, most MA-1 inspection fix-phase actions are reported as support general or unscheduled maintenance. For this reason, the total number of manhours per inspection was assumed to equal the support general manhours for that inspection.

The units-of-work errors referred to above prevented the generation of accurate manhour per inspection data for the preflight and basic postflight inspections. Estimates of the mean values were therefore calculated from the total number of inspection manhours. The mean value of look manhours per basic postflight was calculated to be

$$\overline{\text{MH/BPO}} = \frac{(\Sigma \text{MH})_{\text{BPO}}}{N_{\text{BPO}}} = \frac{(\Sigma \text{MH})_{\text{BPO}}}{N_{\text{SORTIES}}} = 2.63$$

assuming that one inspection is performed for each sortie flown. Similarly, using the ratio of preflights to postflights from Task I, the mean manhours per preflight is

$$\overline{\text{MH/PF}} = \frac{(\Sigma \text{MH})_{\text{PF}}}{N_{\text{PF}}} = \frac{(\Sigma \text{MH})_{\text{PF}}}{\left(\frac{N_{\text{PF}}}{N_{\text{BPO}}}\right) (N_{\text{SORTIES}})} = 2.88.$$

Using the results of Tasks I and II, the number of repair manhours per preflight has been estimated to be less than six percent of the number of look manhours per preflight. The corresponding value for the basic postflight is eight percent. Considering the indirect manner in which the look-manhour values were calculated, the errors in them are probably at least as great as six or eight percent. It was therefore not considered necessary to include the repair manhours in the model.

For the alternative maintenance program, the input data specifies a series of three identical minor inspections followed by a major inspection. In the model, MA-1 alignments are performed with each major and minor inspection, and only with these inspections. The minor and major inspections as defined for the model include lubrication and the flight-hour related special inspections. The tasks comprising these inspections are defined in Appendix V.

The manhours and NORM for the major and minor inspections were calculated using the network analysis model. These results are presented in Table 4-1. The periodic and hourly postflight networks were used for major and minor inspections, respectively. MA-1 alignment manhours were taken to be the same as for the current maintenance program.

Table 4-1. Comparison of Inspections

Inspection Type	Manhours			NORM		
	Current	Alternative	Ratio	Current	Alternative	Ratio
Preflight	2.88	1.83	0.65	0.0	0.0	—
Basic Postflight	2.63	2.22	0.84	0.0	0.0	—
Hourly Postflight [†] /Minor*	54.1	65.3	1.21	47.1	51.8	1.10
Periodic [†] /Major*	457.8	313.7	0.69	354.5	298.5	0.84
MA-1 Alignment	34.6	34.6	1.0	0.0	0.0	—

*Major and Minor inspections include lubrication and flight-hour-related special inspection as detailed in Appendix V.

[†]Hourly postflight and periodic inspection data is based on statistical analysis results for WUCs 03300 and 03400.

The total number of manhours for major and minor inspections for one maintenance period in the alternative program is

$$313.7 + 3(65.3) = 509.6 \text{ manhours.}$$

For one maintenance period in the current program, the corresponding total number of manhours for hourly postflights and periodics is

$$457.8 + 5(54.1) = 728.3 \text{ manhours}$$

These figures correspond to 1.8 manhours per flight hour for the current program, and 1.7 for the alternative program.

The alternative program also includes fewer manhours for preflight and basic post-flight inspections than the current program. Based on the work-card manhour estimates, the preflight inspection requires 1.25 fewer manhours under the alternative program than under the current program. This value must be adjusted, however, to reflect the difference between the work-card estimate for the current preflight (3.53 manhours) and the empirical value of 2.60 manhours. The mean number of manhours per preflight under the alternative program is therefore given by

$$\overline{\text{MH/PF}} = (3.53 - 1.25) (2.88 / 3.53) = 1.86 \text{ manhours.}$$

The manhour savings for the basic postflight is estimated from the work cards to be 0.93 out of a total of 5.9 manhours. Applying an adjustment as for the preflight manhours gives

$$\overline{\text{MH/BPO}} = (5.9 - 0.93) (2.63 / 5.9) = 2.22 \text{ manhours.}$$

The original estimates of 3.53 and 5.9 manhours were obtained from the F-106 Maintenance Management Review Report for 1971.

The inspection manhour and NORM data for the two maintenance programs are compared in Table 4-1.

4.2 COMPARISON OF CURRENT AND ALTERNATIVE PROGRAMS

The effectiveness model results for the current and alternative maintenance programs are compared in Figures 4-1 and 4-2 for a range of maintenance program lengths (MPL). The MPL is defined as the time between periodic inspections for the current program and the time between major inspections for the alternative program. The data in these figures is based on a utilization rate of 4.59 flight hours per week, the rate obtained from the statistical analyses.

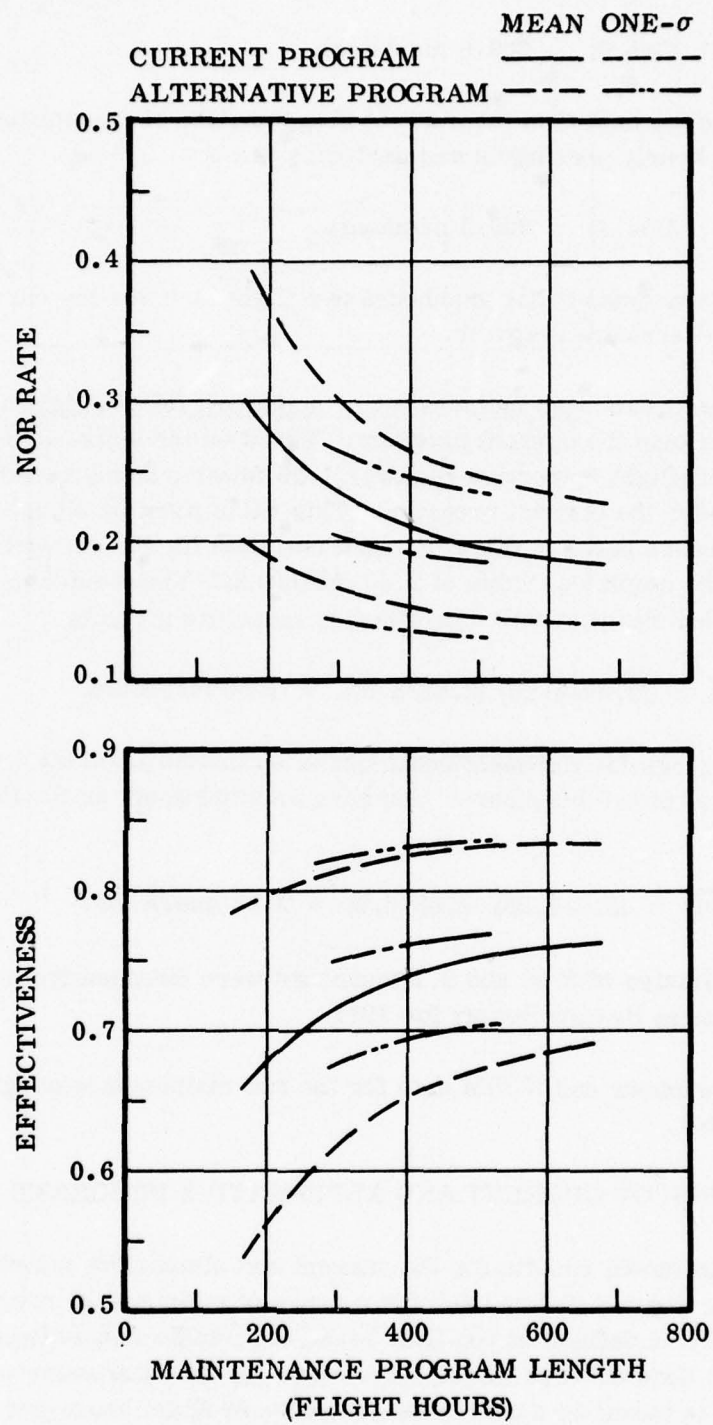


Figure 4-1. NOR Rate and Effectiveness Comparison

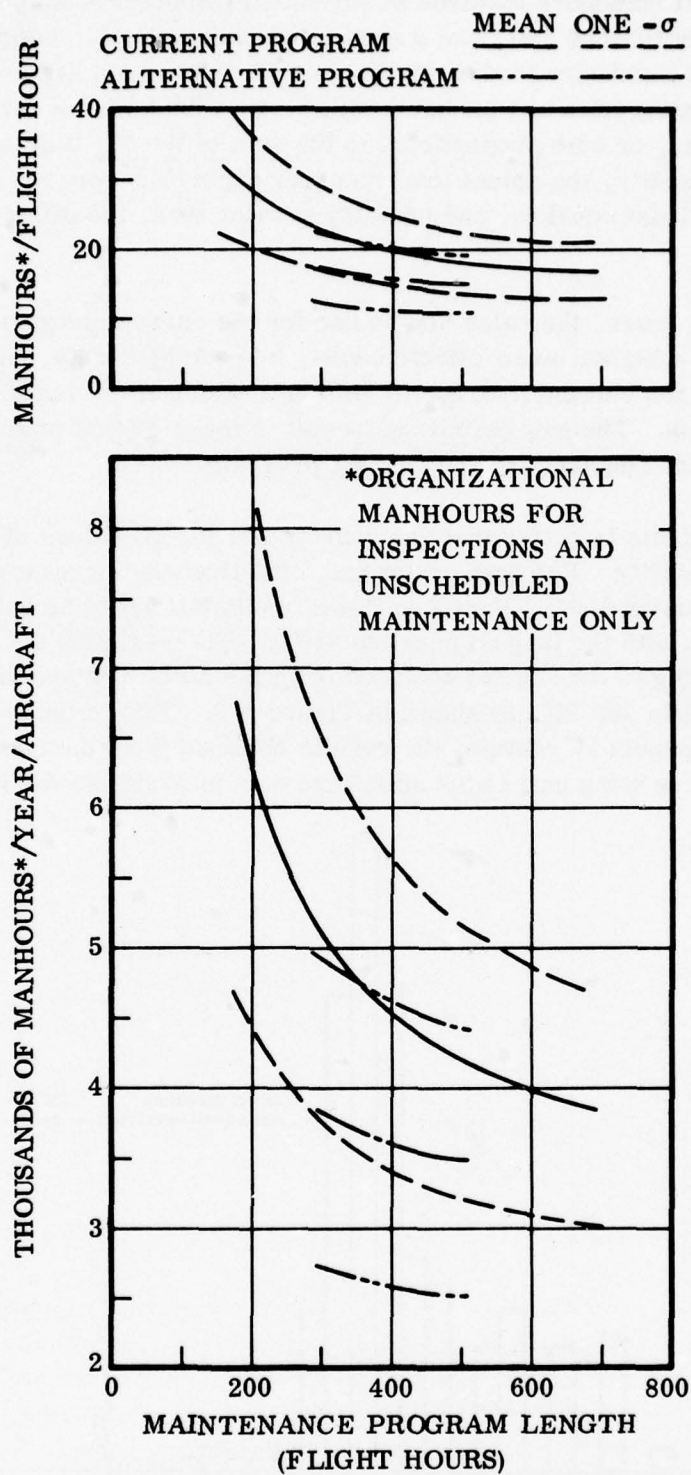


Figure 4-2. Maintenance Manhour Comparison

The manhours in these figures and all other figures in this section include only those direct organizational manhours involved in scheduled inspections (support general code 03), special inspections (04), and unscheduled maintenance. Intermediate level, indirect and support manhours (codes 01, 02, and 05 through 09) are not included. Manhours in these categories are probably either equal for both the current and alternative programs, or else proportional to the sum of the 03, 04, and unscheduled manhours. Consequently, the actual total manhour difference between the two programs should be at least equal to, and possibly greater than, the difference predicted by the model.

At MPL = 300 flight hours, the value now in use for the current program, the alternative program has a higher mean effectiveness, a lower NOR rate, and lower manhour rates than the current program. This is a result of the redefinition of the scheduled inspections. The new definitions result in fewer NORM hours and manhours per unit time than are required for the current program.

The alternative program is better than the current one for all values of MPL within the interval of variability. For both programs, effectiveness increases and manhours decrease with increasing MPL. Based on these results, it would be best to adopt the alternative program with the longest possible MPL. The maximum PE/IRAN interval experienced according to the results obtained from the aircraft inspection histories is somewhat greater than 400 FH, as shown in Figure 4-3. This is based directly on AFM66-1 data. Appendix IV contains the results obtained from data supplied by the squadrons. For some work unit codes no failure data is available for intervals

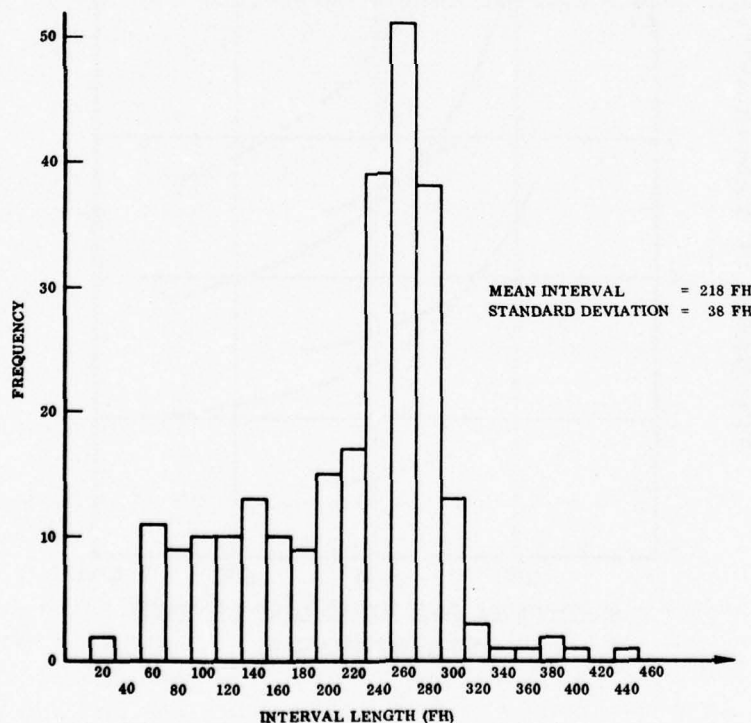


Figure 4-3. Distribution of PE/IRAN Intervals (for 150 Aircraft)

longer than about 400 flight hours. The maximum MPL for which the results in the figures are valid is, therefore, 400 flight hours.

The model predicts that a change from the current program with a 300-flight-hour MPL to the alternative program with 400 flight hours would have the following effects:

- a. An increase in mean effectiveness from 0.72 to 0.76.
- b. A decrease in mean NOR rate from 0.23 to 0.19. This is an expected increase of 0.04 in operational readiness rate. The number of possessed aircraft for a 3-year IRAN interval is $\frac{34}{36} \times 260 = 246$, assuming 2 months of depot. Thus, this increase in availability corresponds to an expected increase (50% probability of occurrence) in the number of OR aircraft in the field of $0.04 \times 246 = 9.84$ or about 10 aircraft. For a 4-year IRAN interval, the number of possessed aircraft is $\frac{46}{48} \times 260 = 249$. This results in an expected increase in OR aircraft in the field of 9.97 or again about 10 aircraft. This expected increase must be understood in terms of the uncertainties in the data and analysis results. As a result of these uncertainties there is only a probability of 67% that the number of OR aircraft will show some increase. An increase as great as 5 aircraft will occur with a probability of 58%.
- c. A decrease of 7.0 manhours per flight hour.
- d. A manhour per aircraft per year decrease of 1540. At a rate of \$9 per manhour, this is an expected annual savings of 3.6 million dollars for a fleet of 260 aircraft. The uncertainties in the data result in a 37% probability of saving at least five million dollars and a 67% probability of saving two million dollars or more.

4.3 CALENDAR TIME INTERVAL CONTROL

Figures 4-4 and 4-5 show the results obtained when the intervals between inspections are specified in weeks rather than in flight hours. These results are not significantly different from those based on flight hour intervals and described in the previous section.

4.4 SENSITIVITY TO UTILIZATION RATE

The effects of utilization rate are shown in Figure 4-6 for intervals controlled by flight hours and in Figure 4-7 for intervals controlled in calendar time. For all practical rates, the alternative program has a higher effectiveness and lower manhours than the current program.

For an isochronal program with the interval control in calendar time, a decrease in utilization has the expected sharp increase in manhours per flight hour for both the current and the alternative maintenance programs. On the other hand, the manhours per year do not increase as rapidly with increased utilization as would be the case with flying-hour control. This is because increased utilization under an isochronal program is in effect an interval extension as measured in flying hours.

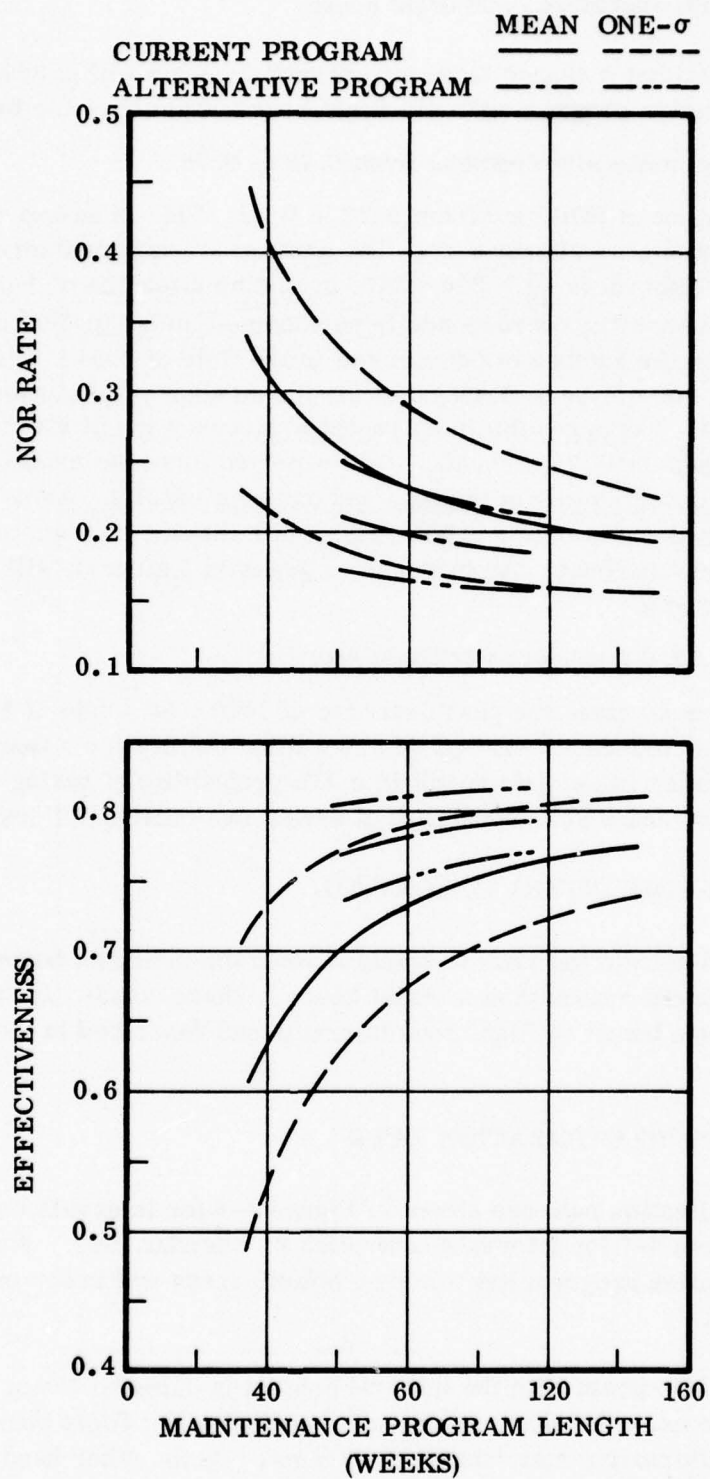


Figure 4-4. NOR Rate and Effectiveness Comparison

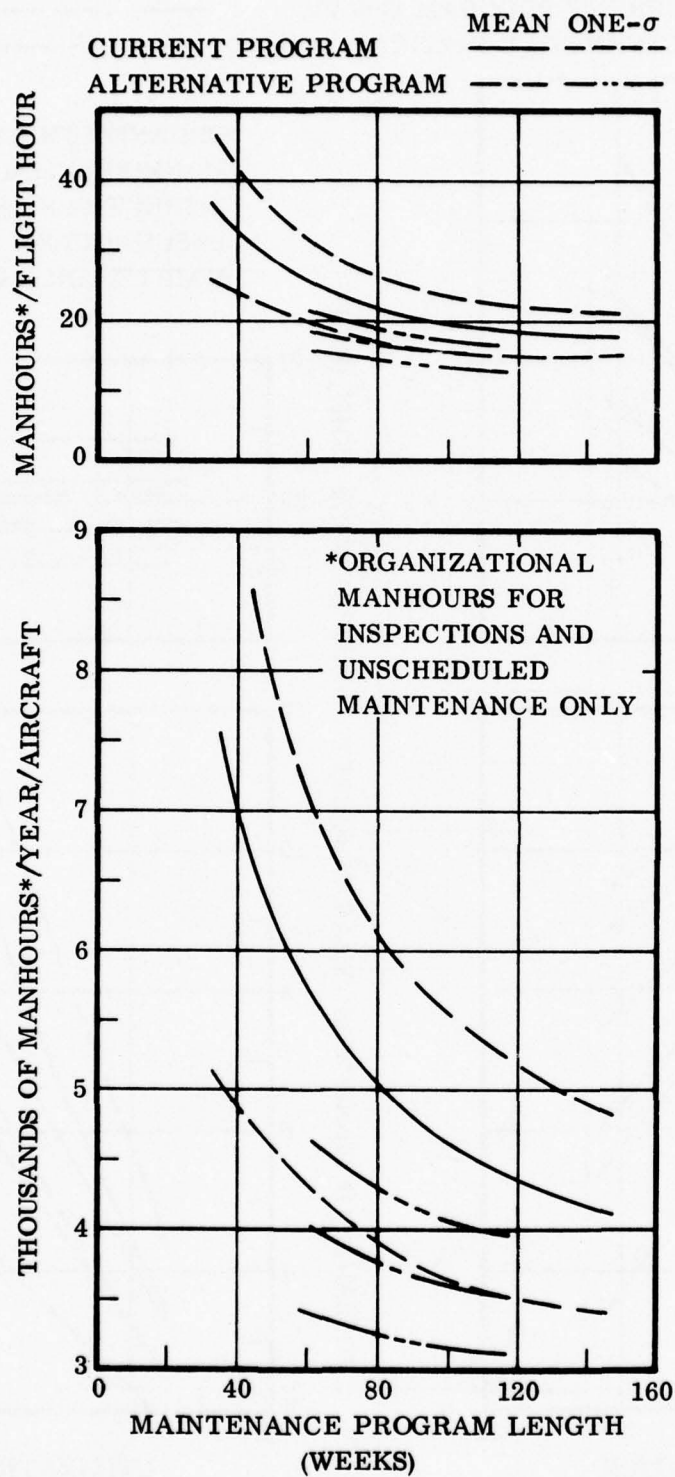


Figure 4-5. Maintenance Manhour Comparison

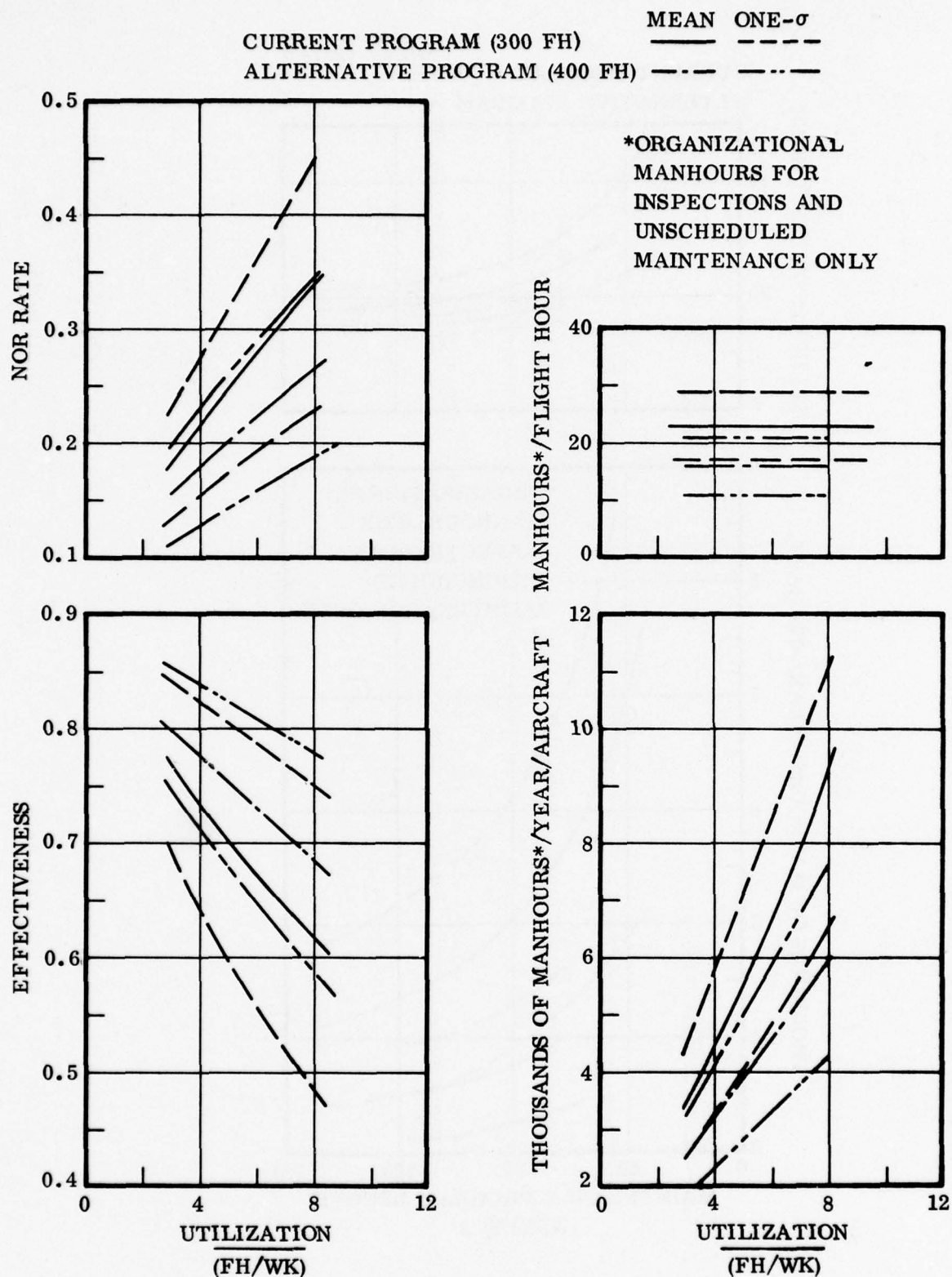


Figure 4-6. Effects of Utilization for Fixed Flight-Hour Interval Lengths

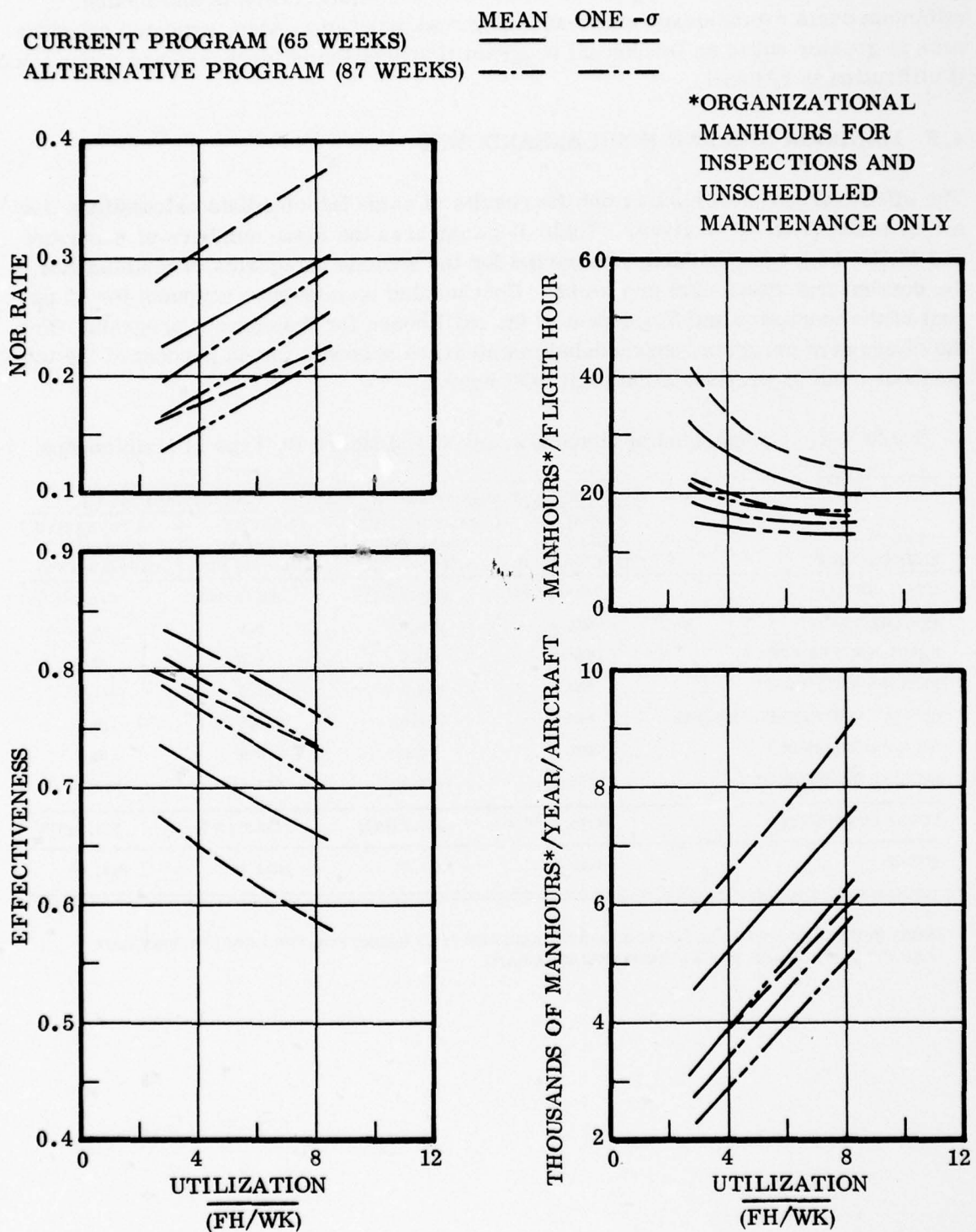


Figure 4-7. Effects of Utilization for Fixed Calendar-Time Interval Lengths

If a decrease in utilization is anticipated, minimum costs are achieved if a flying-hour control on interval is retained. If an increase in utilization is anticipated, minimum costs are achieved under an isochronal program. Also, expected effectiveness is greater under an isochronal program if utilization is increased and about equal if utilization is reduced.

4.5 MANHOUR AND NOR HOUR BREAKDOWNS

The effectiveness model prints out the results of some intermediate calculations that are of interest in themselves. Table 4-2 compares the mean numbers of manhours and NORM hours per maintenance period for the various categories of maintenance in the current and alternative programs. Unscheduled maintenance accounts for 43 percent of the manhours and 32 percent of the NOR hours for the current program. For the alternative program, unscheduled maintenance accounts for 48 percent of the total manhours and 31 percent of the total NOR hours.

Table 4-2. Comparison of Manhours and NORM Hours By Type of Maintenance

TYPE OF MAINTENANCE	MEAN MANHOURS/300 FH		MEAN NORM/300 FH	
	CURRENT PROGRAM (MPL = 300 FH)	ALTERNATIVE PROGRAM (MPL = 400 FH)	CURRENT PROGRAM (MPL = 300 FH)	ALTERNATIVE PROGRAM (MPL = 400 FH)
UNSCHEDULED	3202.0 (43%)	2338.2 (48%)	895.1 (44%)	641.5 (47%)
PREFLIGHTS	535.2	318.0	0.0	0.0
BASIC POSTFLIGHTS	618.6	480.5	0.0	0.0
PERIODICS/MAJORS	492.4	261.2	354.5	223.9
HOURLY POSTFLIGHTS/MINORS	443.1	224.6	235.5	116.5
MA-1 ALIGNMENTS	207.3	0.0	0.0	0.0
SPECIAL INSPECTIONS	1973.5	1229.4	553.6	382.7
TOTAL SCHEDULED	4270.1 (57%)	2513.7 (52%)	1143.6 (56%)	723.1 (53%)
TOTAL	7472.1	4851.9	2038.7*	1364.6*

*NORS HOURS PER INTERVAL OF 300 FLIGHT HOURS ARE 721.3 HOURS FOR THE CURRENT PROGRAM AND 707.3 HOURS FOR THE ALTERNATIVE PROGRAM.

SECTION 5

DATA PROCESSING

5.1 COMPUTER CONSTRAINTS/REQUIREMENTS

A thorough understanding of the computers and operating systems at both SAAMA and Convair Aerospace was essential in the computer software development. The main objective was compatibility: computer programs developed and checked out on the Convair Aerospace IBM 370 computer must be capable of running on the SAAMA IBM 360 or 7080 with minimum modification. Continuing communications between SAAMA and Convair Aerospace computer personnel have been maintained to achieve this compatibility.

5.2 DATA BANK REGENERATION

Raw data tapes received from the AFM 66-1 and AFM 65-110 data systems required considerable manipulation prior to inclusion in the data bank. This processing involved copying the original tape, screening out superfluous data, sorting the data into some order, merging it with other similar tapes and, in the case of 66-1 data tapes, elimination of duplicated records. Each step required a computer program, either an IBM-supplied utility program or a program written in COBOL D. A detailed review of the programs developed for each of the raw data input files is presented in the following paragraphs.

5.2.1 AFM 66-1 INPUT FILE. A COBOL program to dump the 66-1 raw data tape was developed, along with a COBOL program to selectively print a sample of the AFM 66-1 records and a COBOL program to screen out unnecessary data. Screen program criteria for acceptance are:

Record Position

3 - 6	F106
83	J
41 - 42	>0 (DAY)
53 - 55	>0, ≠ 799, 800, 805, 812 (HMC)
51	≠ H, J, T, U (ACTION)
15 - 22	≠ BLANK (S/N)
15 - 22	< 59,999,999 (S/N)
15 - 22	> 57,000,001 (S/N)
15 - 22	≠ 57,000,234 (S/N)
15 - 22	≠ 57,000,239 (S/N)
15 - 22	≠ 57,000,240 (S/N)

Record Position

15 - 22	≠	57,001,523	(S/N)
15 - 22	≠	57,002,507	(S/N)
15 - 22	≠	57,002,516	(S/N)
15 - 22	≠	57,002,519	(S/N)
15 - 22	≠	57,002,523	(S/N)
15 - 22	≠	57,002,529	(S/N)
15 - 22	≠	58,000,795	(S/N)
15 - 22	≠	59,000,061	(S/N)
15 - 22	≠	59,000,150	(S/N)

Also, any seven-digit serial numbers are changed to eight digits prior to the S/N screening process. The day number is calculated, starting 1 Jan 1965, and placed on the output record in positions 86 - 89. The remaining part of the block is padded with 9's as necessary to completely fill the block.

An IBM utility sort program, with the following sort heirarchy fields, is available.

<u>Field</u>	<u>Record Position</u>
1	15 - 22 (S/N)
2	86 - 89 (Day number)
3	46 - 50 (WUC)
4	53 - 55 (HMC)
5	51 - 52
6	56 - 84
7	23 - 45

Two further COBOL programs were developed, one to merge the 66-1 file using the same criteria as the sort program and one a duplicate-record eliminator program.

5.2.2 AFM 65-110 INPUT FILE. Program development status for the AFM 65-100 input file is similar to that for the 66-1 input file. A print COBOL program is available, as is a screening COBOL program; the screening program acceptance criteria are:

Record Position

1 - 4	F106
56 - 58	> 0 (Day)
39 - 46	(as record position
	15-22 for 66-1, above) (S/N)

The day number is calculated, starting 1 Jan 1965, and placed in record positions 49 - 52. The remaining part of the block is padded with 9's as necessary to completely fill the block.

An IBM utility sort program using the following criteria is available:

<u>Field</u>	<u>Record Position</u>
1	39 - 46 (S/N)
2	49 - 52 (Day number)
3	59 (Record ID)
4	34 - 38
5	29

A merge utility program was developed to merge the 65-110 file using the same criteria as the sort program.

5.2.3 AIE (ACCIDENT/INCIDENT/EMERGENCY UNSATISFACTORY MATERIAL REPORT) INPUT FILE. A COBOL program to screen and an IBM utility sort program for the AIE data tape were developed.

5.2.4 IRAN DATA INPUT FILE. A COBOL program was developed to process the IRAN data cards.

5.2.5 DATA RECEIPT AND INPUT. A total of 48 raw AFM 66-1 data tapes were received and processed into the 66-1 data file. A total of 19 raw AFM 65-110 data tapes were received and incorporated in the 65-110 data file.

Only limited data for either IRAN or AIE was received during the scheduled maintenance study period. Data received during the previous IRAN study was utilized.

To facilitate efforts on the data bank, a "logical record" was formulated as shown in Figure 5-1.

5.3 STATISTICAL ANALYSIS PROGRAMMING

Computer programs were developed to perform the statistical analyses. This system of programs was developed for the IBM 370 (see Figure 5-2) using American National Standard (ANS) COBOL and Basic FORTRAN IV languages. All programs were written to be compatible with SAAMA computer equipment.

The statistical analysis programs were organized into five major modules (Task 1 through Task V programs) to perform the required tests. These modules are discussed in Sections 5.3.1 through 5.3.5. An additional set of programs, called the Preprocessor (see Figures 5-2 and 5-3), was developed to sort and reformat the

Ser. No.	Week No.	FH	Sorties	Landings	TYPE 1	
A n n n n n n n n n B						

Ser. No.	Week No.	Visit No.	IRAN Type	Start Day	End Day	TYPE 2	
A n n n n n n n n n B							

Ser. No.	Week No.	WUC	Maint. Actions	MH	NORM	NORS	A I E	TYPE 3	
A n n n n n n n n n B		A A A							

Ser. No.	Week No.	WUC	W D C	HMC	Maint. Actions	MH	TYPE 4	
A n n n n n n n n n B		A A A	A					

Figure 5-1. Logical Record Descriptions

input data bank into three output files which, in turn, were used to input the five major program modules. One other program was developed to plot flight hours versus weeks for Hourly Postflight Inspections, MA-1 Scheduled Calibrations, and Periodic Inspections for each aircraft tail number through use of a lister plot program.

5.3.1 TASK I — FREQUENCY ANALYSIS. This program provides a frequency analysis of the WUC repair actions, using the modified and sorted data-bank file from the Phase I study (see Figure 5-4). The first step is a COBOL program to process the Type 3 SG-WUC (support general-work unit code) records, accumulating the maintenance actions related to specific WDCs (when discovered codes) for both isochronal and non-isochronal aircraft subsets. For a small subset of WUCs, the number of inspections is accumulated in place of the maintenance actions. These totals are manipulated into an acceptable title format and stored. Processing of the data-bank file continues with the Type 4 records, accumulating the maintenance actions for each NSG-WUC/HMC (non-support general - work unit code/how malfunction code) combination. The totals under each NSG-WUC are listed in reports using the previously stored values of SG-WUC frequencies as titles; the reports are about 1800 pages long. Simultaneously, each data line is stored on magnetic tape for subsequent use. No data cutoff is incorporated in this program.

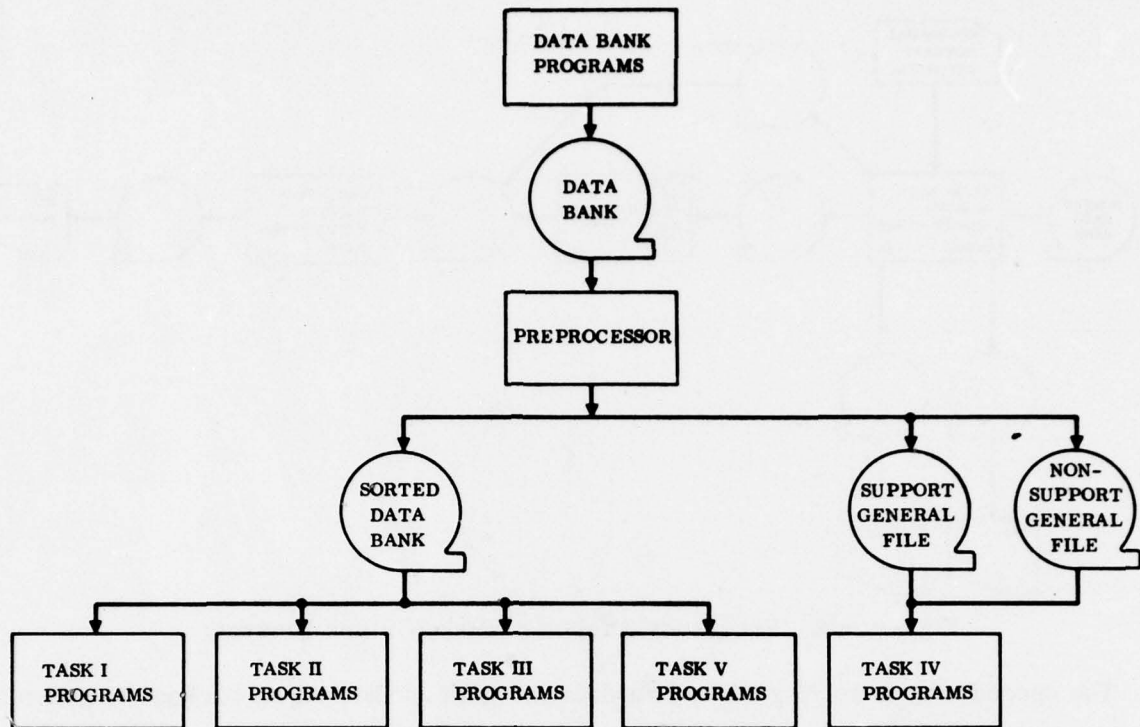


Figure 5-2. Block Diagram of Statistical Analysis Programs

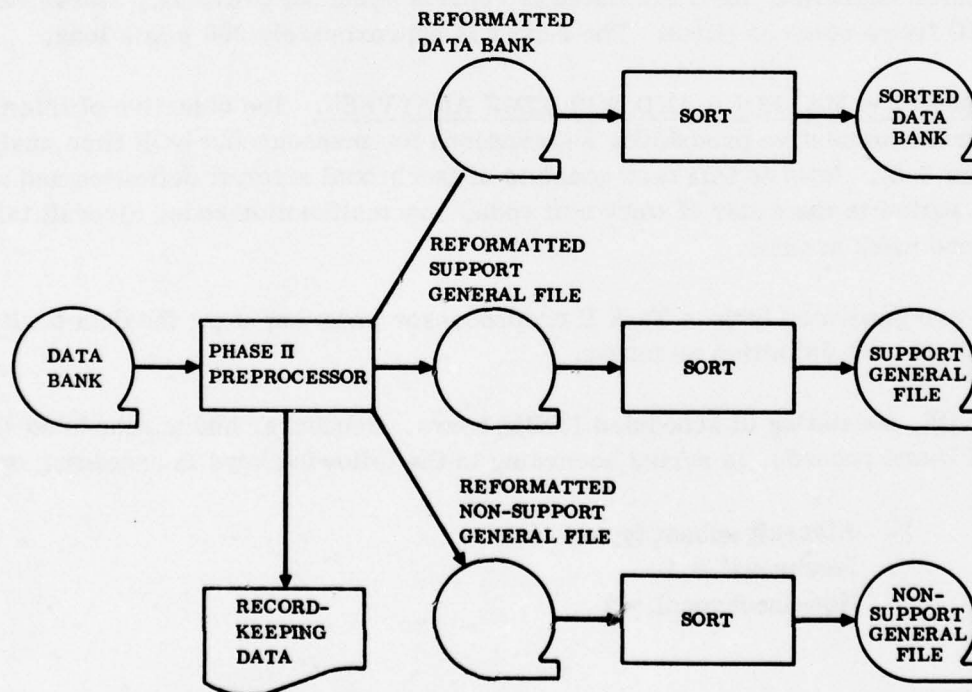


Figure 5-3. Preprocessor Block Diagram

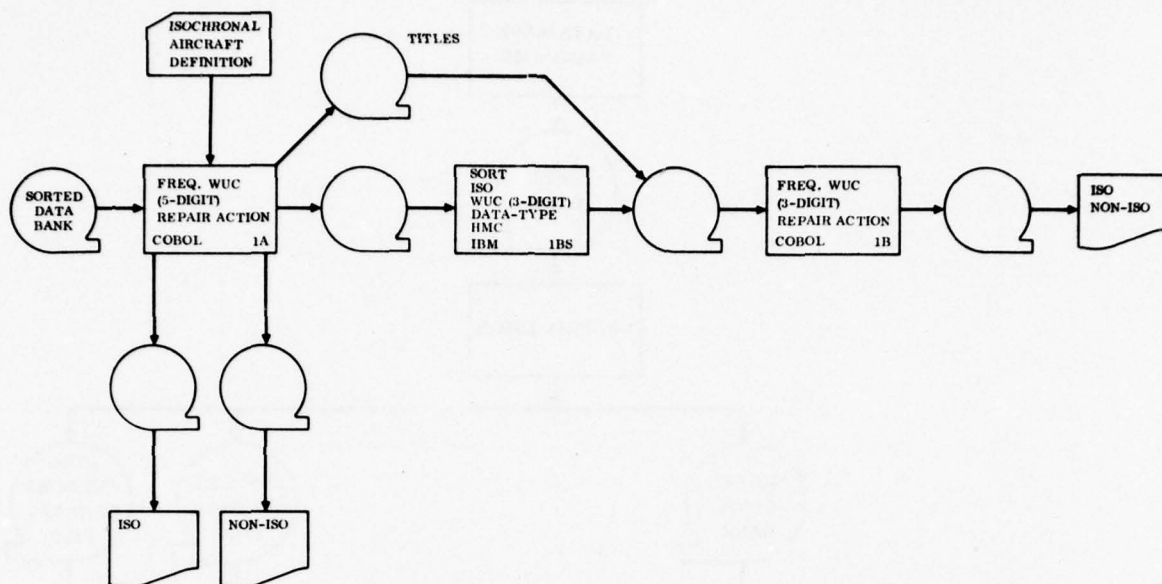


Figure 5-4. Frequency Analysis (Task I) Block Diagram

The second step is sorting of the new data file with an IBM utility package to group all occurrences of HMC data lines under a three-digit WUC and aircraft subset. The final step is a COBOL program using the sorted data file, accumulating the frequency of maintenance actions for each three-digit NSG-WUC and HMC combination. The totals for each three-digit NSG-WUC are listed in reports using the previously stored values of SG-WUC frequencies as titles. The report is approximately 300 pages long.

5.3.2 TASK II — MANHOUR AND NOR TIME ANALYSES. The objective of this task is to generate cumulative probability distributions for manhour and NOR time analysis (see Figure 5-5). Input to this task consists of isochronal aircraft definition and a data bank sorted in the order of work unit code, how malfunction code, aircraft tail number, and week number.

Two files are generated from a Task II preprocessor program using the data bank and isochronal aircraft definition as inputs.

The first file, consisting of scheduled NORM hours, manhours, and unscheduled NORM and NORS hours records, is sorted according to the following keys in ascending order:

1. Aircraft subset type
 - Isochronal = 1
 - Non-isochronal = 2

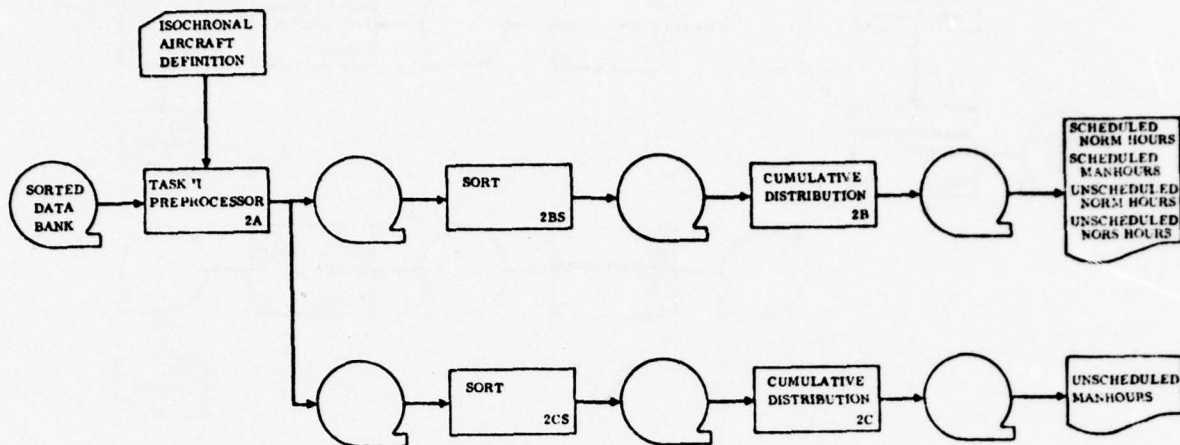


Figure 5-5. Manhour and NOR Time Analysis (Task II) Block Diagram

2. Output data type
 - NORM hours scheduled = 1
 - Manhours scheduled = 2
 - Unscheduled NORM hours = 3
 - Unscheduled NORS hours = 4
3. Work unit code

The second file, consisting of unscheduled manhour records, is sorted in ascending order of aircraft subset type, work unit code, and how malfunction code.

Subsequently, these two sorted files are processed through the Cumulative Distribution program to generate printed reports. Reduction of the printed output required a print-suppression cutoff point of 5 for the isochronal subset and 15 for the non-isochronal subset. That is, if there are five or fewer observations for a particular isochronal aircraft/work unit code combination, the data is not printed.

5.3.3 TASK III — INTERVAL LENGTH ANALYSIS. This program module provides an analysis of repair action intervals and inspection intervals, using the modified and sorted data-bank file from Phase I (see Figure 5-6). The first step is a COBOL program to compute the inspection intervals on the Type 3 records and the repair intervals on the Type 4 records. The end of an inspection is determined as follows: for work unit

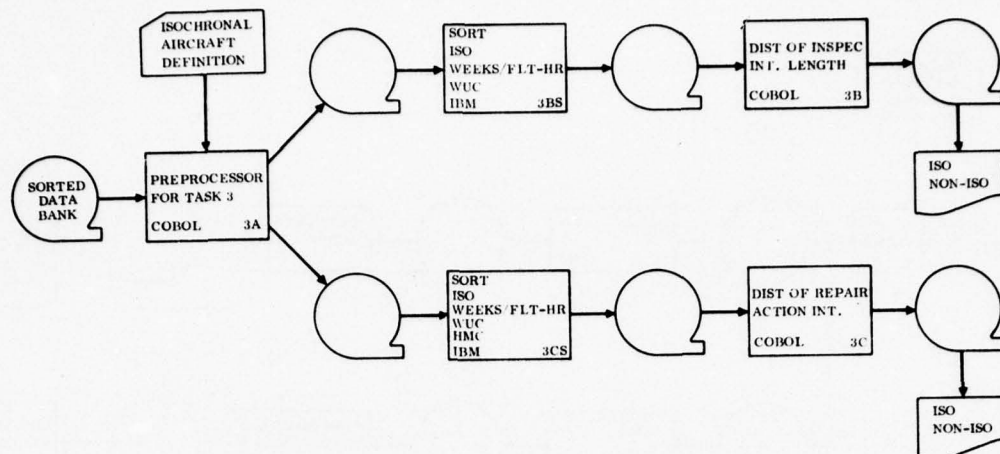


Figure 5-6. Interval Length Analysis (Task III) Block Diagram

codes 03310, 03320, 03330, and 03300 any break of more than two weeks signifies the end of an inspection; for 03400 and 03600 a break of more than four weeks was used. The output is two magnetic tape files sorted such that all observations of the same aircraft subset, WUC, HMC (only for repair action intervals) and data type are grouped.

Each sorted file is used as input to COBOL programs that organize the data and prepare the final cumulative distribution reports. All distribution reports have interval lengths of one week or eight flight hours and a minimum of 50 class intervals, which are increased, as necessary, to a maximum of 200 to include all input data. The following data cutoffs were used to restrict printed output: isochronal subset cutoff was 4 and non-isochronal subset cutoff was 10. The mean and variance of all input data is computed for each distribution. The inspection interval report has 100 pages, and the repair action intervals report has about 900 pages.

5.3.4 TASK IV — EFFECT OF TIME AFTER INSPECTION. This module provides the analysis of the effect of time after an inspection using correlation and regression at both the aircraft and WUC levels (see Figure 5-7). The first step for the aircraft level is a FORTRAN program with computer-selected (up to six) dependent variables for selected (up to four) independent variables. Independent variables used are:

Weeks
Flight Hours

Sorties
Landings

Dependent variables used are:

NORM Hours/Periodic
NORM Hours/Hourly Postflight
AIE/Sortie

FH/Week
Sorties/Week
Landings/Week

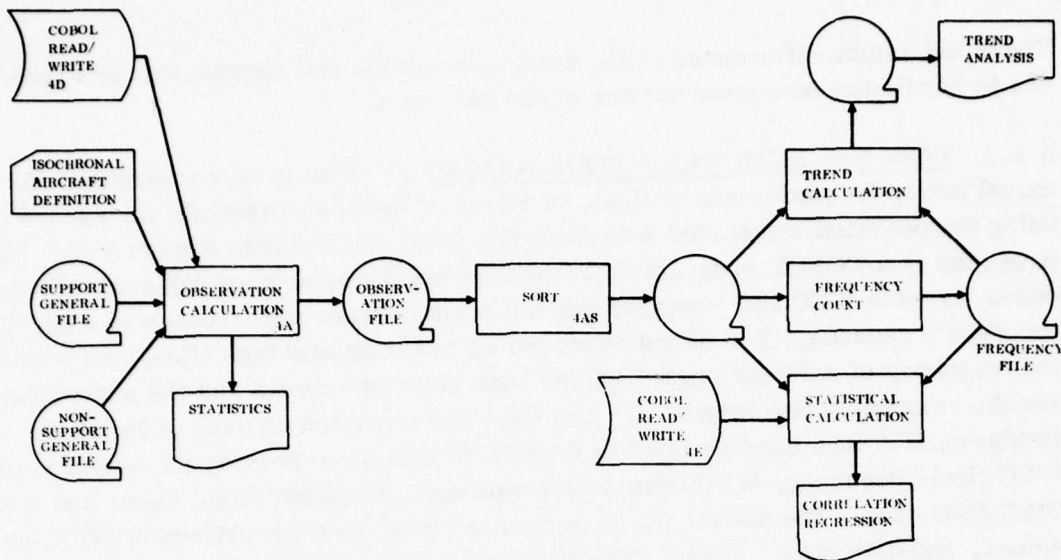


Figure 5-7. Effect of Time After Inspection (Task IV) Block Diagram

To facilitate use of the program on the Kelly AFB computers, all read/write statements are through the COBOL/FORTRAN linkage section, which enables use of multi-reel files. The output is stored on a magnetic tape, which is then sorted to group data types in ascending order of independent variables. The sorted file is then processed with a COBOL program to accumulate statistics from the file. These statistics are then used with the sorted file as input to a second FORTRAN program, which computes the correlation and regression statistics for the data sets. For non-isochronal aircraft data (excluding AIE data for which there is no cutoff) with less than four observations, the output is suppressed. The same two tape files are also used as input to compute the trend analysis, which is a plot of the independent variable versus the mean of the dependent variable for each independent variable period.

Analysis at the WUC level is essentially the same as at the aircraft level; the definition of WUC data sets is defined as part of the input data. The dependent variables are:

- Unscheduled MA/Week
- Unscheduled MA/Flight Hour
- Unscheduled MA/Sortie
- Unscheduled MA/Landing
- Repair Actions/Inspection
- Abort MA/Sortie

There are minor differences in the sort, correlation and regression, and trend analyses to handle the increased volume of the data files.

5.3.5 TASK V — REMOVAL ACTION ANALYSIS. This program provides the removal action frequency and analysis of intervals between removals for each WUC, using the modified and sorted data-bank file from Phase I (see Figure 5-8). The first step is a COBOL program that accumulates the number of removal action taken codes for each WUC and computes the intervals between occurrences of each WUC for Type 3 records. The output is stored on two magnetic tape files, one containing the frequency of ATC for each WUC for both aircraft subsets and the second containing the removal action intervals. The first file is sorted on each of the three data fields; each is then used as input to COBOL programs to provide the output reports of WUC (Iso)/frequency, WUC (Non-Iso)/frequency, frequency/WUC (Iso), and frequency/WUC (Non-Iso). The second file is sorted to group all observations of WUC, aircraft subset, and data type. A final COBOL program prepares the final cumulative distribution reports of 1100 pages with the same options as Task III. The removal frequencies were not subjected to a cutoff, but the removal interval printout had a cutoff of four data points for non-isochronal data.

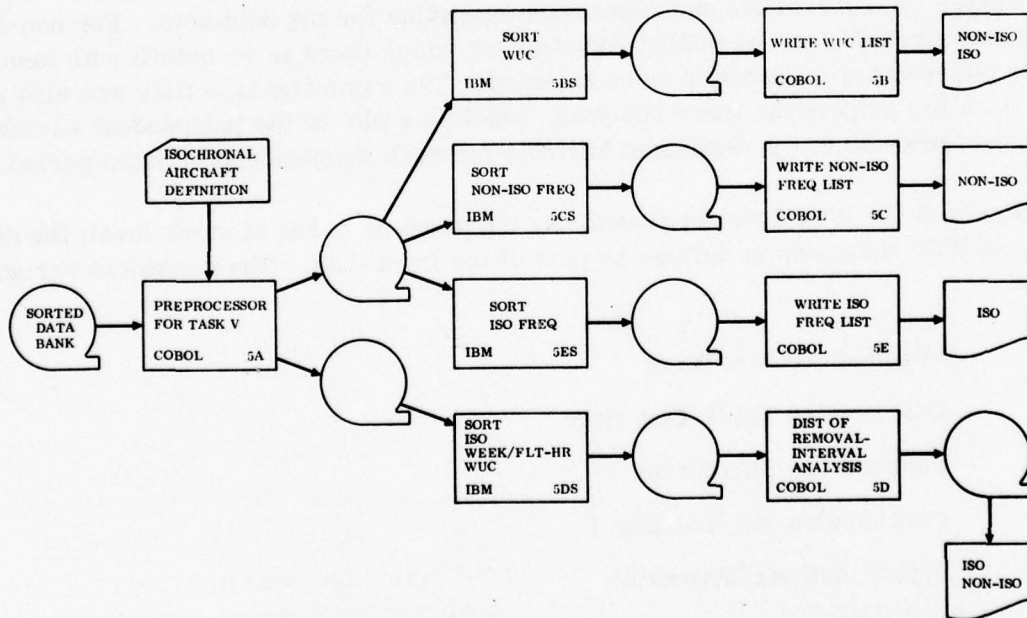


Figure 5-8. Removal Action Analysis (Task V) Block Diagram

5.4 PHASE III TASKS

The data processing tasks during the final phase of the Scheduled Maintenance Study consisted of:

- a. Development and checkout of Manhour and NORM Data Program (Task VII).
- b. Conversion of Network Analysis Model and Effectiveness Model from CDC 6400 to IBM 370.
- c. Generalization of programs for all USAF aircraft.
- d. Preparation of Deck Conversion Program.
- e. Preparation of User's Handbook.

5.4.1 USER'S HANDBOOK. The largest data processing task in Phase III was the preparation of the User's Handbook, Report GDCA-AH072-006. The handbook is organized into four major sections:

Data Reduction Programs

Data Bank Generation

Statistical Analysis Programs

Effectiveness and Cost

For each of the computer programs, written either in COBOL or Basic FORTRAN 4, the following information is given:

Purpose of the Program

Input Description

Sample Input

Procedures

Output Description

Sample Output

Output Size and IBM 370 Time

Notes on Limitations

In addition, an explanation of the analysis of the output for each programming task is given. The remainder of Section 5 is extracted from the User's Manual to give some insight into the programs involved in the Scheduled Maintenance Study.

5.4.2 MANHOUR AND NORM DATA. The objective of this task is to generate, for each work unit code (WUC) set, the mean and variance of manhours per unscheduled maintenance action and NORM per unscheduled maintenance action. In addition, the programs compute the mean value of span time for a repair action on each WUC set. The logic flow is shown in Figure 5-9, and the individual programs are listed in Appendix II.

5.4.2.1 Sum Unscheduled Maintenance Actions. The purpose of this task is to compute the number of unscheduled maintenance actions, the number of repair actions in hourly postflight inspections, and the number of repair actions in periodic inspections on each WUC by how-malfunction code (HMC).

The input consists of the sorted data bank tape and a deck of cards defining the isochronal aircraft group, the when-discovered codes (WDC), and the hourly postflight and periodic inspections.

The card data deck has the following format.

<u>Card</u>	<u>Column</u>	<u>Description</u>
a	3-5	Number of Isochronal Aircraft
b	3-10	Serial Number of Isochronal Aircraft
	3-15	Starting Week Number for Isochronal Inspection
c	5	When-Discovered Codes (WDC)
d	1-3	Number of WDC for Unscheduled Inspections
e	1-3	Position of Each WDC for Unscheduled Inspections
f	1-3	Number of Support General Inspections
g	1-3	Position of WDC Corresponding to Support General Inspection
	6-10	Support General Inspection WUC

A sample input deck, that used for the F-106 Maintenance Study, is shown in Figure 5-10.

The program accumulates the maintenance actions from Type 4 data bank records (Columns 26 through 28) for both aircraft subsets and each WUC and HMC combination, and then writes the total of unscheduled maintenance actions and hourly postflight and periodic inspections on an output magnetic tape file.

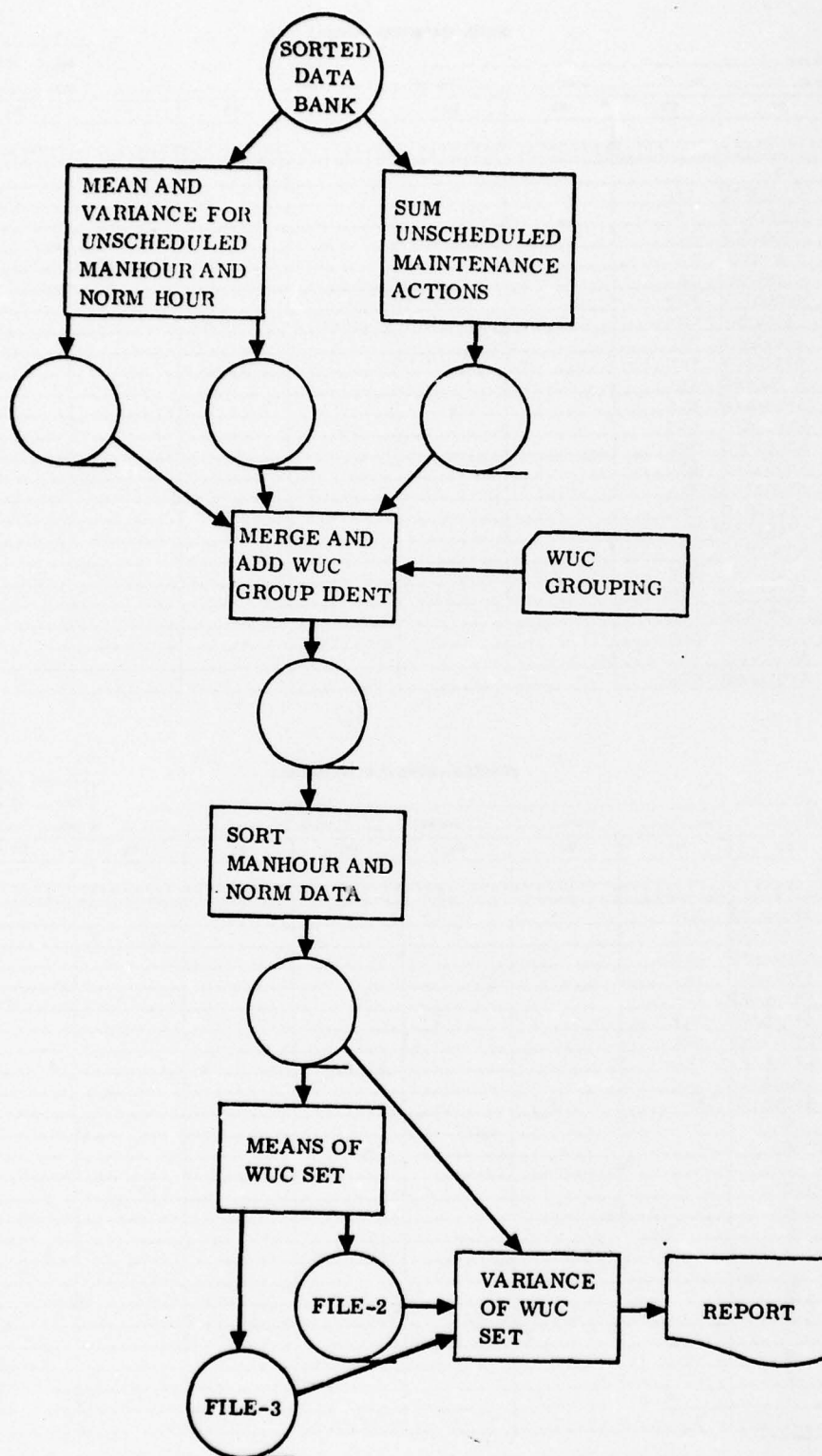


Figure 5-9. Logic Flow -- Manhour and NORM Data

80 COLUMN GENERAL PURPOSE FORM

JOB TITLE _____ ENGINEER _____ PAGE _____ OF _____
 JOB NO. _____ AWO _____ EWO-WAP _____ FUNCTION _____ ANALYST _____ DATE _____

W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8
34							
57000236	331						
57000237	331						
57000243	324						
57000244	331						
57002545	331						
58000774	324						
58000991	331						
59000003	331						
59000003	331						
59000005	331						
59000006	331						
59000010	331						
59000012	331						
59000015	331						
59000018	331						
59000019	331						
59000026	331						
59000030	331						
59000054	324						
59000057	324						
59000058	324						
59000059	324						
59000104	331						
59000105	331						

41000 (REV. 11-84)

80 COLUMN GENERAL PURPOSE FORM

JOB TITLE _____ ENGINEER _____ PAGE _____ OF _____
 JOB NO. _____ AWO _____ EWO-WAP _____ FUNCTION _____ ANALYST _____ DATE _____

W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8
59000108	324						
59000110	324						
59000119	324						
59000141	324						
59000143	324						
59000144	324						
59000145	324						
59000147	324						
59000151	324						
59000152	324						
A							
B							
C							
D							
E							
F							
G							
H							
I							
J							
K							
M							
N							
P							
Q							
R							

41000 (REV. 11-84)

Figure 5-10. Sample Input — Sum Unscheduled Maintenance Actions

80 COLUMN GENERAL PURPOSE FORM

JOB TITLE		ENGINEER		PAGE		OF	
JOB NO.		CWO-IMP		FUNCTION		ANALYST	
DATE		DATE		DATE		DATE	
W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8
1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11
12	12	12	12	12	12	12	12
13	13	13	13	13	13	13	13
14	14	14	14	14	14	14	14
15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16
17	17	17	17	17	17	17	17
18	18	18	18	18	18	18	18
19	19	19	19	19	19	19	19
20	20	20	20	20	20	20	20
21	21	21	21	21	21	21	21
22	22	22	22	22	22	22	22
23	23	23	23	23	23	23	23
24	24	24	24	24	24	24	24
25	25	25	25	25	25	25	25
26	26	26	26	26	26	26	26
27	27	27	27	27	27	27	27
28	28	28	28	28	28	28	28
29	29	29	29	29	29	29	29
30	30	30	30	30	30	30	30
31	31	31	31	31	31	31	31
32	32	32	32	32	32	32	32
33	33	33	33	33	33	33	33
34	34	34	34	34	34	34	34
35	35	35	35	35	35	35	35
36	36	36	36	36	36	36	36
37	37	37	37	37	37	37	37
38	38	38	38	38	38	38	38
39	39	39	39	39	39	39	39
40	40	40	40	40	40	40	40
41	41	41	41	41	41	41	41
42	42	42	42	42	42	42	42
43	43	43	43	43	43	43	43
44	44	44	44	44	44	44	44
45	45	45	45	45	45	45	45
46	46	46	46	46	46	46	46
47	47	47	47	47	47	47	47
48	48	48	48	48	48	48	48
49	49	49	49	49	49	49	49
50	50	50	50	50	50	50	50

10000 (REV. 11-64)

Figure 5-10. Sample Input — Sum Unscheduled Maintenance Actions, Contd

The output magnetic tape file record layout, Figure 5-11, has 50 characters to a data record, blocked 60 to a tape record. The aircraft subset is 1 for isochronal and 2 for non-isochronal aircraft. The three data fields contain the following, for the corresponding WUC and HMC.

Field	Description
1	The number of unscheduled maintenance actions on each WUC, by how-malfunctioned code (HMC). This number is denoted by $N_{uma}(WUC, HMC)$.
2	The number of repair actions in hourly postflight inspections on each WUC, by HMC: $(N_{rep}(WUC, HMC))_{HPO}$
3	The number of repair actions in periodic inspections on each WUC, by HMC: $(N_{rep}(WUC, HMC))_{PE}$

A sample output is shown in Figure 5-12. A recent IBM 370 run for a fleet of 150 aircraft and 2201 WUCs required 10 minutes of computer time and generated 25,920 records.

RECORDS AND WORK AREAS		DATE	BY	REVISED DATE	USED BY PROGRAMS	SECTION
<div> <div>FORM 8046 (REV. 7-70)</div> <div>OUTPUT - SUM UNSCHEDULED MAINTENANCE ACTIONS</div> </div>						
RECORD NAME	FILE NO.	BLOCK	DATE			
FIELD NAME	W.U.C	HMC	UNSCHEDULED MAINTENANCE ACTIONS	REPAIR ACTIONS PERIODIC	REPAIR ACTIONS PERIODIC	
CHARACTER POSITION	1	2	3	4	5	6
<div> <div>OUTPUT - MEAN AND VARIANCE OF UNSCHEDULED MAINTENANCE</div> </div>						
RECORD NAME	FILE NO.	BLOCK	DATE			
FIELD NAME	W.U.C	HMC	MEAN PERIODIC/MA	VARIANCE PERIODIC/MA	VARIANCE PERIODIC/MA	
CHARACTER POSITION	1	2	3	4	5	6
<div> <div>OUTPUT - MEAN AND VARIANCE OF UNSCHEDULED NORM MOVE</div> </div>						
RECORD NAME	FILE NO.	BLOCK	DATE			
FIELD NAME	W.U.C	HMC	MEAN NORM/MA	VARIANCE NORM/MA	VARIANCE NORM/MA	
CHARACTER POSITION	1	2	3	4	5	6
<div> <div>OUTPUT - MERGE AND ADD WUC GROUP IDENTIFIER</div> </div>						
RECORD NAME	FILE NO.	BLOCK	DATE			
FIELD NAME	GROUP WUC	HMC	VARIABLE-1	VARIABLE-2	VARIABLE-3	
CHARACTER POSITION	1	2	3	4	5	6

Figure 5-11. Record Layouts - Manhour and NORM Data

5.4.2.2 Unscheduled Manhours and NORM Hours. The purpose of this program is to generate two output files; one contains unscheduled manhour-per-maintenance-action data, and the other contains unscheduled NORM-hour-per-maintenance-action data (Figures 5-9 and 5-13). Input to this program consists of sorted data bank, isochronal aircraft definition, a selected list of WUCs, and inspection criteria data.

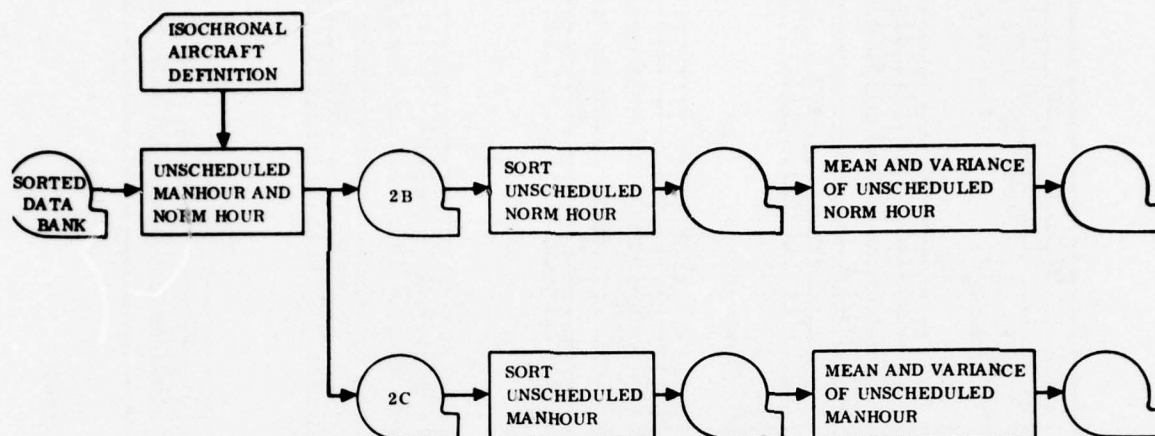


Figure 5-13. Logic Flow - Mean and Variance for Unscheduled Manhours and NORM Hours

There are two types of input data: tape and card deck. Tape data consists of data bank sorted in the order of WUC, HMC, aircraft serial number, and week number. For the tape record layout, see Figure 5-14. The data card deck has the following formats.

<u>Column</u>	<u>Description</u>
Card No. 1:	
1-5	WUC for Hourly Post Flight Inspection
6-10	WUC for MA-1 Scheduled Calibration
11-15	
16-20	
21-25	
26-30	WUC for IRAN Depot Visit
31-35	WUC for Preflight Inspection
36-40	WUC for Basic Postflight Inspection
41-45	WUC for Special Hourly Postflight
46-47	Minimum number of weeks between inspections for the four WUCs in Columns 1 through 20
48-49	Minimum number of weeks between inspections for Periodic Inspection and IRAN Depot Visit
Card No. 2:	
3-5	Number of Isochronal Aircraft (Current program is dimensioned for a maximum of 36 isochronal aircraft, which may be increased by minor program modification.)

RECORDS AND WORK AREAS										DATE		REVISED DATE		BY		USED BY PROGRAMS		SECTION	
RECORD NAME		TYPE 3										FILE NO.		BLOCK		DATE			
FIELD NAME		MDS	SERIAL NO.	WUC	WUC	UNITS	LABOR	ATE	NORM	UNIT	UNIT	FH	FH	Σ	Σ	Σ	Σ	Σ	Σ
VALUE																			
CHARACTER POSITION																			
PICTURE																			
RECORD NAME		TYPE 4										FILE NO.		BLOCK		DATE			
FIELD NAME		MDS	SERIAL NO.	WUC	WUC	UNITS	LABOR	ATE	NORM	UNIT	UNIT	FH	FH	Σ	Σ	Σ	Σ	Σ	Σ
VALUE																			
CHARACTER POSITION																			
PICTURE																			
RECORD NAME		TYPE 5										FILE NO.		BLOCK		DATE			
FIELD NAME																			
CHARACTER POSITION																			
PICTURE																			
RECORD NAME		TYPE 6										FILE NO.		BLOCK		DATE			
FIELD NAME																			
CHARACTER POSITION																			
PICTURE																			

Figure 5-14. Preprocessor Tape Record Layouts

The following cards describe the isochronal aircraft fleet, one card per isochronal aircraft, and the serial numbers are sorted in ascending order.

<u>Column</u>	<u>Description</u>
3-10	Aircraft Serial Number
13-15	Starting Week Number for Isochronal Inspection

Sample input data deck listing is given in Figure 5-15.

The unscheduled manhour and NORM hour program (Figure 5-16) produces two output files, File 2B and 2C, containing the following information.

<u>File</u>	<u>Data Type</u>	<u>Description</u>
2B	3	NORM Hours - Unscheduled Maintenance Actions
2C	1	Manhours - Unscheduled Maintenance Actions

- a. Procedures to Generate Manhours - Unscheduled Maintenance Action (for File 2C, Data Type 1). The manhour distributions are calculated separately for repair actions and unscheduled maintenance actions by accumulating the number of man-hours charged against a specific WUC and a specific HMC for successive weeks until a week is encountered with a nonzero number of maintenance actions. The number of repair actions or unscheduled actions against the same WUC is accumulated at the same time. This data is obtained from Record Type 4. The ratio of these totals provides one observation of manhours-per-maintenance action for this WUC malfunction. Each occurrence of a maintenance action on an aircraft in the bank for the specific WUC malfunction combination provides another observation.
- b. Procedures to Generate NORM Hours - Unscheduled Maintenance Actions (for File 2B, Data Types 3). The distribution for unscheduled NORM hours is obtained in the same fashion, except that only unscheduled maintenance actions are included. Again, NORM hours and maintenance action totals are accumulated from week to week until a nonzero number of maintenance action fields is encountered. The ratio of the two totals then provides one observation of unscheduled NORM hours per maintenance action for the specific WUC. Since the type of malfunction is not recorded in AFM 65-110 (through which NORM hours are recorded), it is not possible to calculate this distribution for a specific type of malfunction. The data for this calculation is obtained from Record Type 3.

80 COLUMN GENERAL PURPOSE FORM

JOB TITLE _____ ENGINEER _____ PAGE _____ OF _____
 JOB NO. _____ ANALYST _____ DATE _____

W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8
0330003310	0332003330	0340003600	0310003200	032100204			
34							
57000236	331						
57000237	331						
57000293	324						
57000294	331						
57002393	331						
58000776	324						
58000701	331						
59000002	331						
59000003	331						
59000005	331						
59000006	331						
59000010	331						
59000012	331						
59000015	331						
59000018	331						
59000019	331						
59000026	331						
59000030	331						
59000054	324						
59000057	324						
59000058	324						
59000059	324						
59000104	331						

80 COLUMN GENERAL PURPOSE FORM

JOB TITLE _____ ENGINEER _____ PAGE _____ OF _____
 JOB NO. _____ ANALYST _____ DATE _____

W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8
59000105	331						
59000108	324						
59000110	324						
59000119	324						
59000141	324						
59000143	324						
59000144	324						
59000145	324						
59000147	324						
59000151	324						
59000152	324						

Figure 5-15. Sample Data — Task II Preprocessor

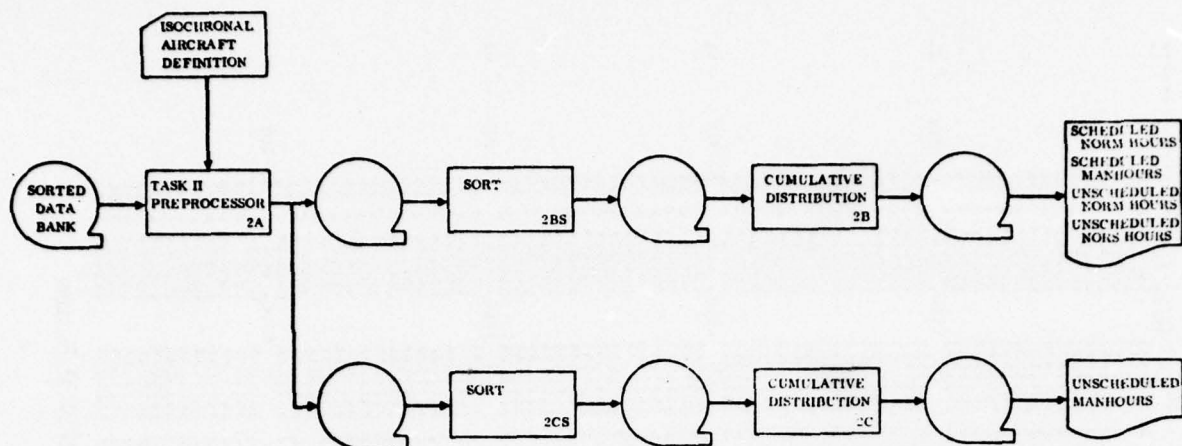


Figure 5-16. Logic Flow — Manhours and NOR Time Analysis (Task II)

The output consists of two tape files (2B and 2C) with 20-character data records blocked 90 to a tape record, with the following formats.

Column	Description
1-5	Work Unit Code (WUC)
6-8	How-Malfunction Code (HMC)
10-15	Observation Data
17	Isochronal Indicator
	= 1 Isochronal Inspection
	= 2 Non-Isochronal Inspection
19	Data Type:
	For File 2B = 3 Unscheduled NORM Hours
	For File 2C = 1 Unscheduled Manhour
20	Record Mark

On a recent IBM 370 run for an F-106 fleet of 150 aircraft and 2201 WUCs, total computer time was about 13 minutes. Records totaling 214,651 and 243,801 were generated for Files 2B and 2C, respectively. A sample output is shown in Figure 5-17.

5.4.2.3 Sort Unscheduled NORM Hours. The purpose of this task is to sort output File 2B for further processing. The input consists of tape File 2B, as described in Paragraph 5.4.2.2. An output tape, 20 characters per record with a blocking factor of 90, consisting of unscheduled NORM hour records, is sorted according to the following keys in ascending order.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524
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Figure 5-17. Sample Output -- Unscheduled Manhours and NORM Hours

<u>Key</u>	<u>Column</u>	<u>Description</u>
1	17	Isochronal Indicator
2	19	Data Type
3	1-5	Work Unit Code

It took about three minutes on the IBM 370 to sort 214,651 records for the 150-aircraft F-106 fleet. A sample output is shown in Figure 5-18.

5.4.2.4 Mean and Variance of Unscheduled NORM Hours. This program generates an output file containing mean and variance unscheduled NORM hour data by WUC, isochronal subset type. No input data is needed for this program. For a given WUC, unscheduled NORM hour data will be accumulated. Values of mean and variance are then computed and are written on the output file. The output file has the following record format.

<u>Column</u>	<u>Description</u>
1	Isochronal Inspection Type = 1 Isochronal = 2 Non-Isochronal
11	Set to 3, for Unscheduled NORM Hours
13-17	Work Unit Code (WUC)
23-30	Mean for Unscheduled NORM Hours
32-39	Variance of Unscheduled NORM Hours
50	Record Mark

It took five minutes on the IBM 370 to process 2872 records for the F-106 fleet. A sample output and output format are shown in Figures 5-19 and 5-11, respectively.

5.4.2.5 Sort Unscheduled Manhours. The purpose of this task is to sort output File 2C for further processing. The input consists of tape File 2C, as described in Paragraph 5.4.2.2. An output tape file, consisting of unscheduled manhours charged against a specific WUC and specific HMC, is sorted according to the following keys in ascending order.

<u>Key</u>	<u>Column</u>	<u>Description</u>
1	17	Isochronal Indicator =1 Isochronal Subset =2 Non-Isochronal Subset
2	19	Data Type =1 Unscheduled Manhours
3	1-5	Work Unit Code (WUC)
4	6-8	How-Malfunction Code (HMC)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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The output tape consists of 20-character data records, blocked 90 to a tape record. It took four minutes to sort 243,801 records for a fleet of 150 F-106 aircraft. A sample output is shown in Figure 5-20.

5.4.2.6 Mean and Variance of Unscheduled Manhours. This program generates an output file containing mean and variance of unscheduled manhour data by HMC, WUC, and isochronal subset type. No input data is needed for this program. For a given WUC and HMC, data of unscheduled manhours will be accumulated. Values of mean and variance are then computed and are written on an output file. The output consists of values of mean and variance of unscheduled manhour, WUC, and HMC. The output file has the following record format.

<u>Column</u>	<u>Description</u>
1	Isochronal Inspection Type =1 Isochronal =2 Non-Isochronal
11	Set to 2, for Unscheduled Manhours
13-17	Work Unit Code (WUC)
19-21	How-Malfunction Code (HMC)
23-30	Mean for Unscheduled Manhours
32-39	Variance for Unscheduled Manhours
50	Record Mark

The tape file consists of 50-character data records, blocked 60 to a tape record. To generate 27,121 records for a fleet of 150 F-106 aircraft required six minutes on the IBM 370. A sample output from a recent F-106 run and the output record format are shown in Figures 5-21 and 5-11, respectively.

5.4.2.7 Merge and Add WUC Group Identification. The purpose of this COBOL program is to merge the output files of Manhour and NORM, Mean and Variance of Unscheduled NORM Hour, and Mean and Variance of Unscheduled Manhour data into one file and to classify each record into a particular WUC group.

The input consists of three data tape files and a deck of cards defining the WUC groups. The three input data tape files are described in Paragraphs 5.4.2.1, 5.4.2.4, and 5.4.2.6, and the record layouts are given in Figure 5-11. The data deck has the following format.

<u>Card</u>	<u>Column</u>	<u>Description</u>
a	1-2	Number of WUCs in WUC Set No. 1
b	1-3	WUCs in Set No. 1
c	1-2	Number of WUCs in WUC Set No. 2
d	1-5	WUCs in Set No. 2

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.	51.	52.	53.	54.	55.	56.	57.	58.	59.	60.	61.	62.	63.	64.	65.	66.	67.	68.	69.	70.	71.	72.	73.	74.	75.	76.	77.	78.	79.	80.	81.	82.	83.	84.	85.	86.	87.	88.	89.	90.	91.	92.	93.	94.	95.	96.	97.	98.	99.	100.	101.	102.	103.	104.	105.	106.	107.	108.	109.	110.	111.	112.	113.	114.	115.	116.	117.	118.	119.	120.	121.	122.	123.	124.	125.	126.	127.	128.	129.	130.	131.	132.	133.	134.	135.	136.	137.	138.	139.	140.	141.	142.	143.	144.	145.	146.	147.	148.	149.	150.	151.	152.	153.	154.	155.	156.	157.	158.	159.	160.	161.	162.	163.	164.	165.	166.	167.	168.	169.	170.	171.	172.	173.	174.	175.	176.	177.	178.	179.	180.	181.	182.	183.	184.	185.	186.	187.	188.	189.	190.	191.	192.	193.	194.	195.	196.	197.	198.	199.	200.	201.	202.	203.	204.	205.	206.	207.	208.	209.	210.	211.	212.	213.	214.	215.	216.	217.	218.	219.	220.	221.	222.	223.	224.	225.	226.	227.	228.	229.	230.	231.	232.	233.	234.	235.	236.	237.	238.	239.	240.	241.	242.	243.	244.	245.	246.	247.	248.	249.	250.	251.	252.	253.	254.	255.	256.	257.	258.	259.	260.	261.	262.	263.	264.	265.	266.	267.	268.	269.	270.	271.	272.	273.	274.	275.	276.	277.	278.	279.	280.	281.	282.	283.	284.	285.	286.	287.	288.	289.	290.	291.	292.	293.	294.	295.	296.	297.	298.	299.	300.	301.	302.	303.	304.	305.	306.	307.	308.	309.	310.	311.	312.	313.	314.	315.	316.	317.	318.	319.	320.	321.	322.	323.	324.	325.	326.	327.	328.	329.	330.	331.	332.	333.	334.	335.	336.	337.	338.	339.	340.	341.	342.	343.	344.	345.	346.	347.	348.	349.	350.	351.	352.	353.	354.	355.	356.	357.	358.	359.	360.	361.	362.	363.	364.	365.	366.	367.	368.	369.	370.	371.	372.	373.	374.	375.	376.	377.	378.	379.	380.	381.	382.	383.	384.	385.	386.	387.	388.	389.	390.	391.	392.	393.	394.	395.	396.	397.	398.	399.	400.	401.	402.	403.	404.	405.	406.	407.	408.	409.	410.	411.	412.	413.	414.	415.	416.	417.	418.	419.	420.	421.	422.	423.	424.	425.	426.	427.	428.	429.	430.	431.	432.	433.	434.	435.	436.	437.	438.	439.	440.	441.	442.	443.	444.	445.	446.	447.	448.	449.	450.	451.	452.	453.	454.	455.	456.	457.	458.	459.	460.	461.	462.	463.	464.	465.	466.	467.	468.	469.	470.	471.	472.	473.	474.	475.	476.	477.	478.	479.	480.	481.	482.	483.	484.	485.	486.	487.	488.	489.	490.	491.	492.	493.	494.	495.	496.	497.	498.	499.	500.	501.	502.	503.	504.	505.	506.	507.	508.	509.	510.	511.	512.	513.	514.	515.	516.	517.	518.	519.	520.	521.	522.	523.	524.	525.	526.	527.	528.	529.	530.	531.	532.	533.	534.	535.	536.	537.	538.	539.	540.	541.	542.	543.	544.	545.	546.	547.	548.	549.	550.	551.	552.	553.	554.	555.	556.	557.	558.	559.	560.	561.	562.	563.	564.	565.	566.	567.	568.	569.	570.	571.	572.	573.	574.	575.	576.	577.	578.	579.	580.	581.	582.	583.	584.	585.	586.	587.	588.	589.	590.	591.	592.	593.	594.	595.	596.	597.	598.	599.	600.	601.	602.	603.	604.	605.	606.	607.	608.	609.	610.	611.	612.	613.	614.	615.	616.	617.	618.	619.	620.	621.	622.	623.	624.	625.	626.	627.	628.	629.	630.	631.	632.	633.	634.	635.	636.	637.	638.	639.	640.	641.	642.	643.	644.	645.	646.	647.	648.	649.	650.	651.	652.	653.	654.	655.	656.	657.	658.	659.	660.	661.	662.	663.	664.	665.	666.	667.	668.	669.	670.	671.	672.	673.	674.	675.	676.	677.	678.	679.	680.	681.	682.	683.	684.	685.	686.	687.	688.	689.	690.	691.	692.	693.	694.	695.	696.	697.	698.	699.	700.	701.	702.	703.	704.	705.	706.	707.	708.	709.	710.	711.	712.	713.	714.	715.	716.	717.	718.	719.	720.	721.	722.	723.	724.	725.	726.	727.	728.	729.	730.	731.	732.	733.	734.	735.	736.	737.	738.	739.	740.	741.	742.	743.	744.	745.	746.	747.	748.	749.	750.	751.	752.	753.	754.	755.	756.	757.	758.	759.	760.	761.	762.	763.	764.	765.	766.	767.	768.	769.	770.	771.	772.	773.	774.	775.	776.	777.	778.	779.	780.	781.	782.	783.	784.	785.	786.	787.	788.	789.	790.	791.	792.	793.	794.	795.	796.	797.	798.	799.	800.	801.	802.	803.	804.	805.	806.	807.	808.	809.	810.	811.	812.	813.	814.	815.	816.	817.	818.	819.	820.	821.	822.	823.	824.	825.	826.	827.	828.	829.	830.	831.	832.	833.	834.	835.	836.	837.	838.	839.	840.	841.	842.	843.	844.	845.	846.	847.	848.	849.	850.	851.	852.	853.	854.	855.	856.	857.	858.	859.	860.	861.	862.	863.	864.	865.	866.	867.	868.	869.	870.	871.	872.	873.	874.	875.	876.	877.	878.	879.	880.	881.	882.	883.	884.	885.	886.	887.	888.	889.	890.	891.	892.	893.	894.	895.	896.	897.	898.	899.	900.	901.	902.	903.	904.	905.	906.	907.	908.	909.	910.	911.	912.	913.	914.	915.	916.	917.	918.	919.	920.	921.	922.	923.	924.	925.	926.	927.	928.	929.	930.	931.	932.	933.	934.	935.	936.	937.	938.	939.	940.	941.	942.	943.	944.	945.	946.	947.	948.	949.	950.	951.	952.	953.	954.	955.	956.	957.	958.	959.	960.	961.	962.	963.	964.	965.	966.	967.	968.	969.	970.	971.	972.	973.	974.	975.	976.	977.	978.	979.	980.	981.	982.	983.	984.	985.	986.	987.	988.	989.	990.	991.	992.	993.	994.	995.	996.	997.	998.	999.	1000.
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Figure 5-20. Sample Output - Sort Unscheduled Manhours

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[illegible]

A sample input data deck, that used for the F-106 Maintenance Study, is shown in Figure 5-22.

The program reads WUC group data and assigns a group identifier to each WUC set. The first input file record is read, the appropriate group identifier and corresponding group WUC is added to the record, and the record is written on an output file. This is continued for each input record, then for each record on the second and third input files. After the last input record, the output tape record is padded with nines to end the routine.

The output consists of a magnetic tape file, 50 characters to a data record, blocked 60 to a tape record. The record layout is shown in Figure 5-11. The significance of each variable is determined by reference to the RECORD ID in Column 11; this was assigned during creation of the three input data files. A sample of output data is shown in Figure 5-23. On a recent IBM 370 run for a fleet of 150 aircraft and 2201 WUCs, total computer time was two minutes. A total of 55,853 records were generated.

5.4.2.8 Sort Manhour and NORM Data. The purpose of this task is to sort the output file from Merge and Add WUC Group Identification for further processing. The input consists of the tape file from the Merge and Add WUC Group Identification described in Paragraph 5.4.2.7. The output file, 50 characters to the data record, blocked 60 to a tape record, is sorted according to the following keys.

<u>Key</u>	<u>Column</u>	<u>Description</u>
1	1	Aircraft Subset (Ascending)
2	2-3	Group Identification (Ascending)
3	13-17	WUC (Ascending)
4	19-21	HMC (Descending)
5	11	Record Identification (Ascending)

It required about two minutes on the IBM 370 to sort 55,860 records for the 150-aircraft F-106 fleet.

5.4.2.9 Means of WUC Set. The purpose of this task is to compute the mean values of various data from the data bank, by WUC group. The input data consists of the sorted output of the data at the five-digit WUC level previously described. The program generates two output files: data at the five-digit WUC level and data at the WUC group level. The output consists of two magnetic tape files, both 50 characters to a data record, blocked 60 to a tape record. The format of each data record is shown in Figure 5-11.

80 COLUMN GENERAL PURPOSE FORM

JOB TITLE _____ ENGINEER _____ PAGE _____ OF _____
 JOB NO. _____ AWO _____ TWO-WAY _____ FUNCTION _____ ANALYST _____ DATE _____

W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8
0000000000	1111111111	2222222222	3333333333	4444444444	5555555555	6666666666	7777777777
1111111111	2222222222	3333333333	4444444444	5555555555	6666666666	7777777777	8888888888
43							
11J							
11K							
11							
12A							
12							
13G							
13J							
13							
14							
23P							
23M							
23N							
23Q							
23S							
23							
41E							
41							
43E							
43F							
43G							
43							
44							
45E							
45J							

80 COLUMN GENERAL PURPOSE FORM

JOB TITLE _____ ENGINEER _____ PAGE _____ OF _____
 JOB NO. _____ AWO _____ TWO-WAY _____ FUNCTION _____ ANALYST _____ DATE _____

W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8
0000000000	1111111111	2222222222	3333333333	4444444444	5555555555	6666666666	7777777777
1111111111	2222222222	3333333333	4444444444	5555555555	6666666666	7777777777	8888888888
43							
45A							
45B							
45C							
45D							
45E							
45							
47							
49A							
49							
51							
52							
55							
63							
65							
71							
75							
93							
97							
11							
14566							
74A							
74B							
74C							
74D							

Figure 5-22. Sample Input – Merge and Add WUC Group Identification

[illegible]

Figure 5-23. Sample Output ~ Merge and Add WUC Group Identification

A sample output is shown in Figure 5-24. At the WUC group level, the following variables are computed and written on File - 3.

Mean manhours per unscheduled maintenance action:

$$\overline{\text{MH/uma}} = \frac{1}{N_1} \sum_{\text{WUC}} \left\{ \sum_{\text{HMC}} [\overline{\text{MH/ma}}(\text{WUC}, \text{HMC}) \cdot N_{\text{uma}}(\text{WUC}, \text{HMC})] \right\}$$

$$N_1 = \sum_{\text{WUC}} \sum_{\text{HMC}} N_{\text{uma}}(\text{WUC}, \text{HMC})$$

Mean NORM per unscheduled maintenance action:

$$\overline{\text{NORM/uma}} = \frac{1}{N_1} \sum_{\text{WUC}} [N_2 \cdot \overline{\text{NORM/ma}}(\text{WUC})]$$

Mean manhours per periodic inspection repair action:

$$(\overline{\text{MH/rep}})_{\text{PE}} = \frac{\sum_{\text{WUC}} \left\{ \sum_{\text{HMC}} [\text{MH/ma}(\text{WUC}, \text{HMC}) \cdot N_{\text{rep}}(\text{WUC}, \text{HMC})_{\text{PE}}] \right\}}{\sum_{\text{WUC}} \sum_{\text{HMC}} [N_{\text{rep}}(\text{WUC}, \text{HMC})_{\text{PE}}]}$$

Mean manhours per hourly postflight inspection repair action:

$$(\overline{\text{MH/rep}})_{\text{HPO}} = \frac{\sum_{\text{WUC}} \left\{ \sum_{\text{HMC}} [\text{MH/ma}(\text{WUC}, \text{HMC}) \cdot N_{\text{rep}}(\text{WUC}, \text{HMC})_{\text{HPO}}] \right\}}{\sum_{\text{WUC}} \sum_{\text{HMC}} [N_{\text{rep}}(\text{WUC}, \text{HMC})_{\text{HPO}}]}$$

In these equations, the symbol \sum_{WUC} indicates a summation over all WUCs in the set.

A sample output is shown in Figure 5-25.

On a recent IBM 370 run for an F-106 fleet of 150 aircraft and 2201 WUCs, total computer time was two minutes. A total of 2886 records were generated on File -2 and 108 records were generated on File -3.

Figure 5-24. Sample Output — Mean of WUC Set, File-2

5.4.2.10 Variance of WUC Set. This COBOL program computes the variance of various data from the data bank and prints the final mean and variance results in convenient tabular form.

The input consists of three files: the sorted output data at the five-digit WUC level and the two files from the Mean of WUC Set program. The program computes the variance of NORM and manhours per unscheduled maintenance action, reads in the previously computed mean values, and then prints out six data results for each WUC group of each aircraft subset.

The output consists of a file, 100 characters to a data record, blocked 20 to a tape record. The variances are first computed for the WUC group using all three input files as follows:

Variance of manhours per unscheduled maintenance action:

$$\sigma_{MH/uma}^2 = \frac{1}{N_1} \sum_{WUC} \left\{ N_2 \cdot A^2 + \sum_{HMC} \left[N_{uma}(WUC, HMC) \cdot \sigma_{MH/ma}^2(WUC, HMC) + B^2 \right] \right\}$$

where:

$$A = \frac{C}{N_2} - \overline{MH/uma}$$

$$B = \overline{MH/ma}(WUC, HMC) - \frac{C}{N_2}$$

Variance of NORM per unscheduled maintenance action:

$$\sigma_{NORM/uma}^2 = \frac{1}{N_1} \sum_{WUC} N_2 \left\{ \sigma_{NORM/ma}^2(WUC) + \left[\overline{NORM/ma}(WUC) - \overline{NORM/uma} \right]^2 \right\}$$

For each aircraft subset and WUC group, the output file contains:

- WUC group descriptor.
- Aircraft Subset.
- Mean Manhours/Unscheduled Maintenance Action.
- Variance of Manhours/Unscheduled Maintenance Action.
- Mean NORM/Unscheduled Maintenance Action.
- Variance of NORM/Unscheduled Maintenance Action.
- Mean Manhours/Periodic Inspection Repair Action.
- Mean Manhours/Hourly Postflight Inspection Repair Action.

A sample output is shown in Figure 5-26. It required two minutes to process the input files for 150 F-106 aircraft; 114 lines of output were generated.

RESULTS OF PROCESSING MAINTENANCE MANHOUR AND NORM DATA								PAGE 1
WUC	AIRCRAFT	MANHOUR	VARIANCE	MANHOUR	VARIANCE	MANHOUR	VARIANCE	
11J	ISO	8.1	66.2	5.7	166.1	2.9	2.7	
11K	ISO	2.0	3.1	5.0	1.1	2.4	3.3	
11L	ISO	2.3	26.5	5.1	6.7	2.2	1.5	
12B	ISO	1.5	1.3	5.0	19.2	5.2	2.0	
12C	ISO	4.3	17.8	5.9	11.7	1.8	2.6	
13C	ISO	7.9	32.8	5.9	4.1	4.0	2.0	
13J	ISO	3.1	11.2	1.0	29.9	2.3	2.5	
14	ISO	4.8	121.9	2.0	62.2	3.9	3.3	
23K	ISO	3.4	7.7	5.7	11.6	1.3	2.0	
23M	ISO	3.1	6.3	5.9	34.0	3.2	1.0	
23N	ISO	3.4	16.0	2.4	19.7	0.0	1.6	
23O	ISO	4.3	12.0	1.8	18.1	1.4	1.4	
23S	ISO	7.9	32.8	2.7	9.3	1.0	2.4	
23J	ISO	7.0	82.4	2.4	82.6	6.4	9.1	
41F	ISO	3.0	3.6	1.5	12.7	4.0	4.0	
41I	ISO	3.4	8.5	1.4	29.0	2.2	5.5	
42E	ISO	3.2	3.9	1.9	7.3	1.5	3.0	
42F	ISO	5.6	41.9	1.0	9.7	5.5	3.9	
42G	ISO	3.9	1.0	1.0	14.6	1.0	3.7	
42H	ISO	1.7	13.4	1.3	29.0	3.8	2.7	
42J	ISO	4.7	38.5	1.4	7.8	1.8	1.4	
45E	ISO	2.1	2.3	1.5	60.3	1.8	1.6	
45J	ISO	2.9	18.2	1.9	23.2	3.1	5.5	
46A	ISO	8.4	105.1	1.0	13.6	6.9	5.0	
46C	ISO	9.6	61.3	1.4	19.3	2.7	1.3	
46G	ISO	4.5	47.4	1.7	4.8	4.6	2.8	
46H	ISO	3.7	96.9	1.2	5.5	2.7	2.0	
46J	ISO	3.2	32.3	1.5	17.4	3.7	1.9	
46	ISO	4.3	15.6	1.4	16.8	5.9	4.1	
49A	ISO	4.4	30.4	1.1	6.2	1.9	1.4	
49	ISO	1.5	1.3	1.0	10.7	1.6	1.6	
51	ISO	3.5	37.0	5.4	6.2	1.9	4.1	
52	ISO	2.6	22.3	5.5	7.5	7.5	1.3	
53	ISO	2.1	26.8	5.7	13.9	1.2	1.6	
65	ISO	2.5	6.3	5.8	17.1	3.6	5.7	
71	ISO	2.4	12.5	5.7	8.6	6.6	2.6	
75	ISO	2.9	21.7	5.4	1.9	2.1	2.4	
93	ISO	3.2	11.8	5.7	3.0	2.7	1.7	
97	ISO	4.8	44.5	5.6	2.0	1.3	1.6	
74CJO	ISO	1.5	2.6	1.0	25.6	2.7	1.1	
74A	ISO	2.3	23.1	1.0	4.1	1.7	1.4	
74B	ISO	1.2	1.4	1.3	23.0	1.3	1.6	
74C	ISO	1.2	4.1	1.6	5.1	1.2	1.5	
74D	ISO	2.6	7.3	1.4	4.6	2.3	1.1	
74F	ISO	1.8	32.1	1.5	17.1	1.8	1.3	
74H	ISO	2.9	9.5	1.9	58.9	1.4	1.1	
74K	ISO	2.3	3.9	1.9	123.3	2.6	4.0	
74L	ISO	1.9	5.4	2.2	8.7	1.7	2.4	
74Q	ISO	2.7	11.1	1.1	1.5	2.1	1.6	
11J	NCN-ISO	2.4	6.4	1.1	35.1	2.7	3.3	
11K	NCN-ISO	2.9	30.1	1.1	38.6	2.7	1.6	
11L	NCN-ISO	2.1	35.1	1.1	21.2	2.1	1.6	
12B	NCN-ISO	2.0	4.4	1.1				
12C	NCN-ISO	2.5	13.3	1.1				
13C	NCN-ISO	4.8	41.9	1.1				
13J	NCN-ISO	3.2	21.2	1.1				

Figure 5-26. Sample Output - Variance of WUC

5.4.3 CONVERSION OF NETWORK ANALYSIS MODEL AND EFFECTIVENESS MODEL FROM CDC 6400 TO IBM 370. The original computer programs for the Network Analysis Model and Effectiveness Model completed by Convair were written for and run on the Control Data 6400 computer. After initial debugging, these programs were converted and run on the IBM 370. The problems encountered in the conversion were:

- Subscript of a variable
- End of file test
- Doubly subscripted variable in singly subscripted form
- Excessive comment cards ,
- Input data format
- Word size in characters
- Precision problem

The source program listings are shown in Appendix III.

5.4.4 GENERALIZATION OF PROGRAMS FOR ALL USAF AIRCRAFT. Although a fleet of 150 F-106 aircraft was used to validate the design of all the computer programs on the IBM 370 at Convair Aerospace, the programs have been generalized to be applicable to all USAF aircraft. Near the end of Phase II of the Scheduled Maintenance Study program, it was discovered that some of the F-106 related data were built into the various programs as constants. To generalize the design to cover all USAF aircraft, those constants have been changed to variables which will be read in as input data.

As a consequence, some programs developed during Phases I and II of this study were modified. Substantial changes were made on the Phase II programs, particularly Tasks I, II, III, and V. Listings of the latest version of the service programs are contained in Section 6 of the User's Handbook.

5.4.5 DECK CONVERSION PROGRAM. There are a number of differences between the COBOL programs written for the IBM 370 used by Convair Aerospace and the IBM 360 utilized by SAAMA. Several contacts were made between SAAMA and Convair programming personnel to identify these differences.

The differences between 360 and 370 COBOL are:

- Program ID Statement
- File Control
- SYNC
- GOBACK
- Carriage Control
- Job Control Cards

For the convenience of the users, some modifications were made on the IBM 370 COBOL programs before they were copied onto magnetic tape. Modifications performed manually were:

- Replace GOBACK with STOP RUN.
- Carriage control character changed to 0, 1 or blank.
- Program ID Statement change.

Due to frequent appearance of SYNC in the IBM 370 programs, a COBOL program was developed to remove all the SYNC in the Data Division of all the COBOL programs. Listing of the Deck Conversion Program is shown in Appendix I.

For conversion to the IBM 360 at SAAMA, the remaining tasks for the user are:

- Produce IBM 360 job control cards.
- Modify file — control.
- Generate input data cards.

SECTION 6

TRANSITION STRATEGY

The decision to place the F-106 fleet on the new maintenance program should be based on the results of a test program. The number of aircraft to be included in the test and the duration of the test are both parameters which have an impact on the costs and risks associated with the new maintenance program. These factors are treated explicitly in the following analysis.

The statistical confidence in the cost and effectiveness of the new program, as determined by the test, depends on the test sample size; this in turn is a function of the number of aircraft in the test and its duration. Keeping the remainder of the fleet on the current maintenance program while the test is in progress results in maintenance cost penalties. These cost penalties offset the value of the greater knowledge, resulting from the test, of the impact of the new maintenance program. However, in order to minimize any unforeseen adverse effects on the safety or availability of the F-106 fleet, it is prudent to hold the test fleet to as small a number of aircraft as practicable. The transition strategy analysis approach is shown in Figure 6-1.

The optimum values of the test program parameters can be obtained by minimizing the total expected costs. The variables used in this analysis are defined as follows:

M_T	= Test manhours required to support test program/month/test aircraft.
C_D	= \$ Cost of data processing during test/month/test aircraft.
C_p	= Test personnel cost (\$/MH).
C_m	= Direct organizational maintenance manhour cost (\$/MH).
$\overline{MH/MO}_0$	= Expected maintenance manhours/month/aircraft under current maintenance program.
$\overline{MH/MO}_n$	= Predicted expected maintenance manhours/month/aircraft under new maintenance program.
$\sigma_{MH/MO}$	= Standard deviation of new program maintenance manhours per month.
F_T	= Fleet size (250 aircraft).
T	= Duration of test (months).
N	= Number of test aircraft.
L	= Assumed life of system (months).

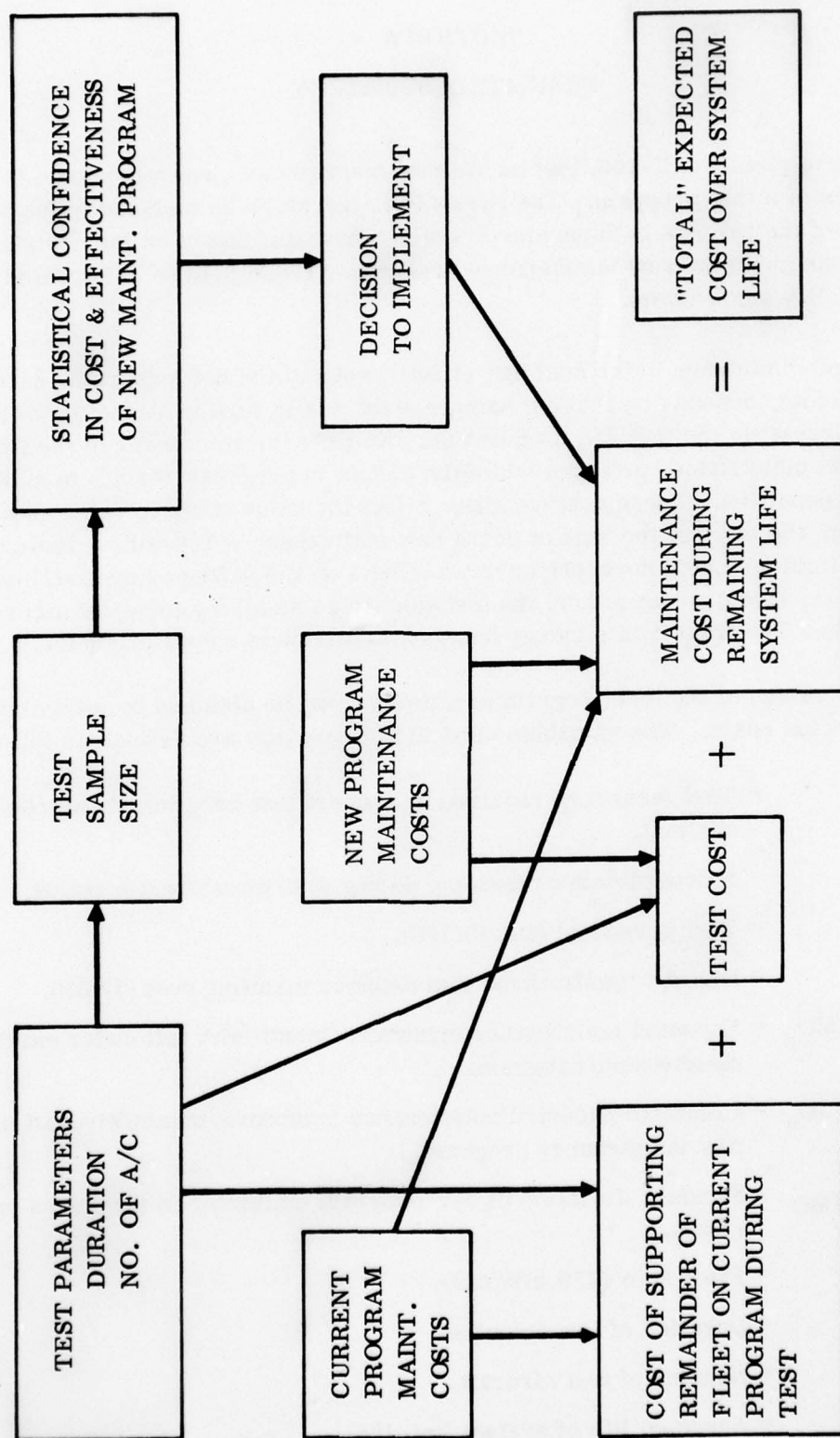


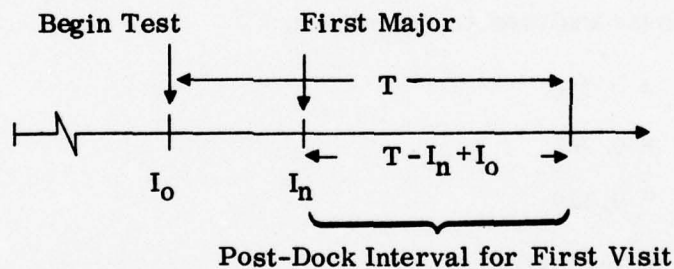
Figure 6-1. Transition Strategy Analysis Approach

- \bar{E}_n = Predicted expected effectiveness under new program.
 \bar{E}_o = Expected effectiveness under current program.
 σ_{E_n} = Standard deviation of predicted new program effectiveness.
 I_n = Major inspection interval of new maintenance program.
 $\gamma(N, T, L)$ = Total expected cost/month as a function of N, T, and L.

The total expected cost depends on the probability that the mean effectiveness for the new program, as established by the test, exceeds that of the current program and that in addition the expected maintenance manhours per unit time for the new program are less than for the old. That is,

$$\begin{aligned}
 p &= \Pr \{ \text{Implement New Maintenance Program} \} \\
 &= \Pr \{ \bar{E}_n > \bar{E}_o \text{ and } \overline{MH/MO}_n < \overline{MH/MO}_o \} \\
 &= [1 - \Pr \{ \bar{E}_n \leq \bar{E}_o \}] \Pr \{ \overline{MH/MO}_n < \overline{MH/MO}_o \}.
 \end{aligned}$$

When the test program is initiated for the N test aircraft, they are placed on the new program at that time but, because they have been on a 300 FH interval, will not undergo the major inspection until the new interval I_n since the last periodic inspection has elapsed. At the beginning of the test the oldest aircraft interval possible is I_o (300 FH), and the first major inspection will begin $I_n - I_o$ months later. Data collection, of course, is initiated immediately and the impact of the minor inspections can be assessed early.



At time $I_n - I_o$ after the beginning of the test, the N test aircraft start entering the dock at the rate N/I_n . The expected number of aircraft thus receiving the major inspection during the test is $(N/I_n)(T - I_n + I_o)$.

The average length of the post-dock interval in the test in months for these aircraft is then $(1/2)(T - I_n + I_o)$, and the expected number of post-dock test months is

$$\frac{(T - I_n + I_o)}{2} .$$

The total expected cost is the total of the cost of conducting the test while the remainder of the fleet is on the old program plus supporting the whole fleet on either the new or the old program for the remaining life of the system. The equation for this total expected cost per month is

$$\gamma(N, T, L) = \frac{1}{L} \left\{ NT (M_T C_p + C_D + \overline{MH/MO}_n \cdot C_m) + (F_T - N) T \overline{MH/MO}_o \cdot C_m \right. \\ \left. + (1 - p) F_T (L - T) \overline{MH/MO}_o \cdot C_m + p F_T (L - T) \overline{MH/MO}_n \cdot C_m \right\},$$

where

$$p = \left[1 - \eta \left(\frac{(\bar{E}_o - \bar{E}_n)(T - I_n + I_o) \sqrt{N}}{\sigma_{E_n} \sqrt{2 I_n}}; 0, 1 \right) \right] \eta \left(\frac{(\overline{MH/MO}_o - \overline{MH/MO}_n)(T - I_n + I_o) \sqrt{N}}{\sigma_{MH/MO_n} \sqrt{2 I_n}}; 0, 1 \right)$$

The above equation reduces to

$$\gamma(N, T, L) = F_T \overline{MH/MO}_o \cdot C_m + \frac{NT}{L} (M_T C_p + C_D) \\ - C_m (\overline{MH/MO}_o - \overline{MH/MO}_n) \left[\frac{NT}{L} + p F_T \left(1 - \frac{T}{L} \right) \right]$$

This equation for total expected organizational maintenance and test program cost per month was evaluated as a function of N , T , and L for different test program costs per test aircraft per month. The actual values used for the various parameters as obtained from the effectiveness analyses are as follows:

\bar{E}_o	= 0.716
\bar{E}_n	= 0.762
σ_{E_n}	= 0.120
$\overline{MH/MO}_o$	= 428 MH/Mo.
$\overline{MH/MO}_n$	= 300 MH/Mo.
C_m	= \$9.00
$\sigma_{MH/MO}$	= 142
F_T	= 250 aircraft
I_n	= 20 Mo.
I_o	= 15 Mo.

$$K_1 = M_T C_p + C_D = \$300, \$1200, \$2500, \$4500$$

$$L = 60, 120 \text{ months.}$$

As the first step in analyzing these results, total expected cost per month was treated as a function of the number of test aircraft for specific values of T or test duration. That number of test aircraft which minimized total expected cost per month was then determined for each value of T . This minimum total expected cost per month is given in Figure 6-2 as a function of the test duration. The corresponding number of test aircraft for minimum total expected cost is given as a function of test duration in Figure 6-3.

From these results, that test duration which minimized total expected cost per month for different test costs per aircraft per month and assumed system lives of 5 and 10 years was determined, along with the corresponding optimum number of test aircraft. These results are given in Figure 6-4 as a function of test cost per month per test aircraft.

The results given in Figure 6-4 indicate that optimum test duration is not very sensitive to test cost per aircraft per month or to the system life assumed, but varies between 8 and 12 months with a value of 9 months at the midpoint of the range of the test cost per aircraft per month. At that point the optimum number of test aircraft is a little greater than 60 aircraft.

The results described above lead to the conclusion that a test program involving 60 aircraft and lasting as long as 9 months is preferred. If sequential sampling techniques are used it may be possible to bring the test to a close before the 9 months estimated. Thus the test program should require 3 squadrons.

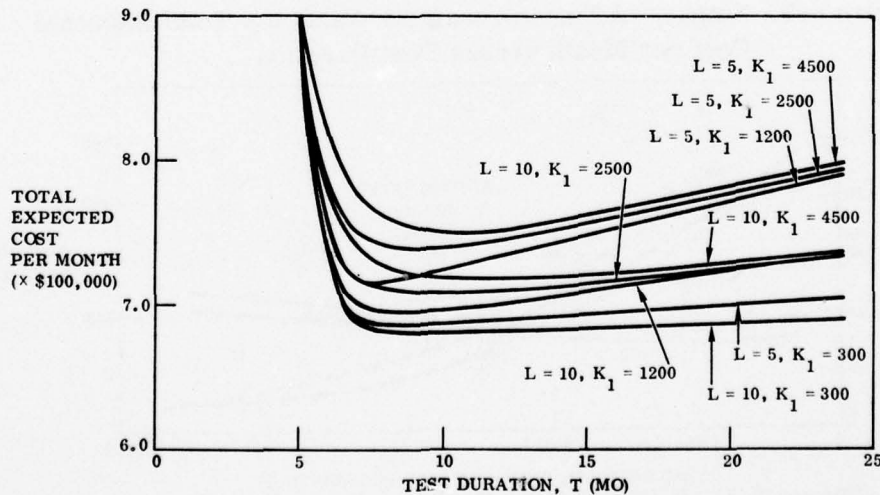


Figure 6-2. Minimum Total Expected Cost per Month Versus Test Duration

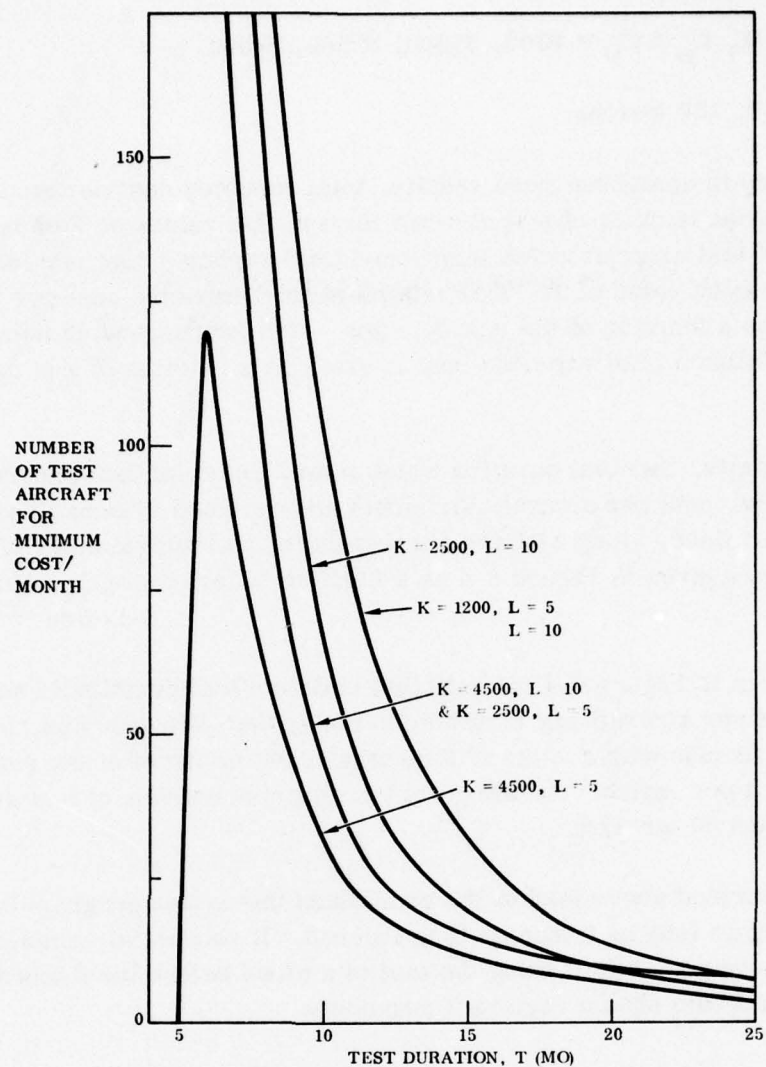


Figure 6-3. Number of Test Aircraft for Minimum Total Expected Cost per Month versus Test Duration

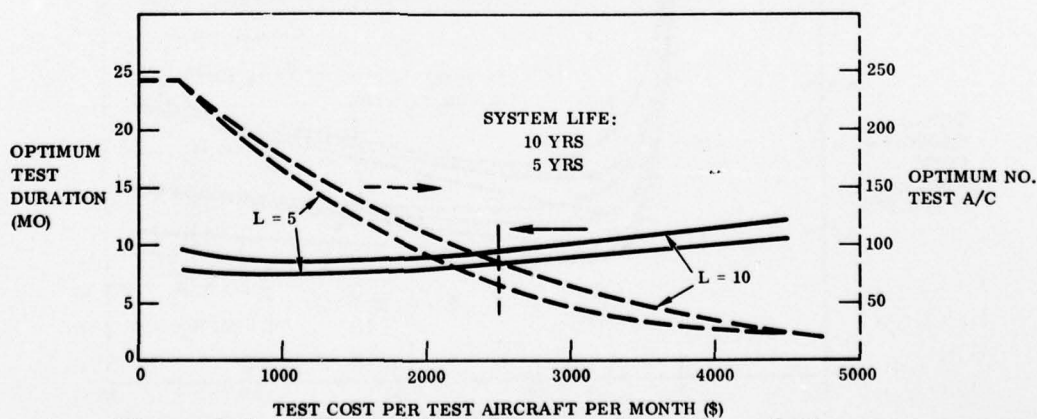


Figure 6-4. Effect of Test Cost per Aircraft on Optimum Values of Test Program Parameters

Variables that should be measured during the test are maintenance manhours and the several variables included in the measure of effectiveness: abort rate, AIE rate, NORM hours, and NORS hours.

The predicted confidence that test results will show the expected effectiveness for the new program to be not less than that of the old is determined as follows, assuming a 60-aircraft test for 9 months:

$$\begin{aligned} \Pr \{ \bar{E}_n < \bar{E}_o \} &= \eta \left(\bar{E}_o; \bar{E}_n, \frac{\sigma_{E_n}}{\sqrt{n}} \right) \\ &= \eta \left(\frac{(\bar{E}_o - \bar{E}_n)(T - I_n + I_o) \sqrt{N}}{\sigma_{E_n} \sqrt{2 I_n \Delta I}} ; 0, 1 \right) \\ &= \eta (-1.80; 0, 1) = 0.034 \end{aligned}$$

In other words, there is a probability of only 3.6% that test program results will indicate that the new program will degrade cost and effectiveness, a probability of 96.4% that the new program will be demonstrated to improve costs and effectiveness.

Upon completion of the test program, if test results are favorable in terms of the mean effectiveness and mean maintenance manhours, the remainder of the fleet should be immediately placed on the new maintenance program.

The procedure for accomplishing the transition, which would also be followed during the test, is to make use of the 10% interval-length extension permitted to gain the added flexibility needed in scheduling inspections. The result of this approach is to achieve an average interval length of 400 FH for the first major inspection. The recommended scheduling procedure is given in Table 6-1.

Table 6-1. Procedure for Scheduling Inspections During Transition to New Maintenance Program

Preceding Scheduled Inspection	Next Scheduled Inspection	Interval to Next Inspection (FH)	Initial Major Inspection Interval (FH)
PE	Minor	110	440
HPO ₅₀ -1	Minor	110	380
HPO ₁₀₀ -1	Minor	110	430
HPO ₁₅₀	Minor	110	370
HPO ₁₀₀ -2	Minor	110	420
HPO ₅₀ -2	Major	110	360
			Avg = 400

SECTION 7

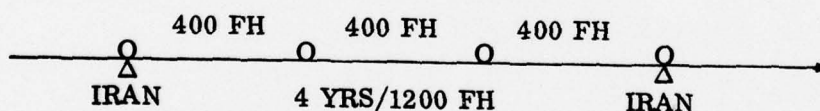
IRAN AND BASE LEVEL MAINTENANCE INTERACTIONS

The interaction between maintenance activity within the squadron in the field and that performed at depot during IRAN centers around the question of how much of the field level periodic or major inspection is normally accomplished as part of an IRAN visit.

Analysis of the current IRAN Work Specification requirements indicates that fully 2/3 of the current periodic inspection is accomplished during IRAN. Since the periodic inspection in the field currently averages 450 manhours for the look and fix phase, the current periodic inspection could be accomplished at the depot for an additional 100 to 150 manhours (probably 125 manhours). For the new major inspection of the recommended F-106 maintenance program, only 50 to 100 manhours in addition to the current IRAN requirements are needed to complete a major inspection at the depot.

In addition, the IRAN interval of 4 years and the current periodic interval of 300 flight hours (with 400 flight hours recommended for the new major inspection interval) are consistent with performing a major inspection as part of IRAN. At the current utilization rate of 300 flight hours per year, 4 years corresponds to about 1200 flight hours. This means that for the current maintenance program every fourth PE could be accomplished in IRAN. For the new maintenance program every third major inspection could be accomplished along with the IRAN.

O - Major



Flow times for the major inspection are consistent with IRAN requirements, with a PE averaging 14.7 days and always less than 30 days, and with the major inspection averaging 12 days with a standard deviation of 7 days. On the other hand, availability is enhanced since this amount of downtime is avoided in the field.

An additional amount of NOR hours is avoided by performing the major inspection at the depot since historically the major inspection has always resulted in additional post-dock downtime in the field. For the current periodic inspection, this additional downtime has been from three to six days.

SECTION 7

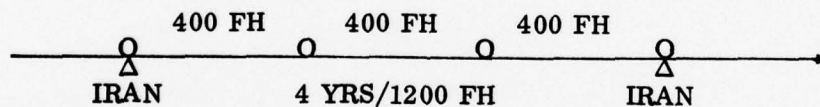
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SECTION 8

CONCLUSIONS

The VE12 study has been successful in determining an improved scheduled maintenance program for the F-106 aircraft. Scheduled manhour savings expected if the new program is adopted will be approximately \$3.6 million annually. In addition, the expected increased availability afforded by this program is the equivalent of adding 10 possessed aircraft to the F-106 fleet.

The Convair Aerospace-recommended scheduled maintenance program should be adopted following the successful completion of the test program delineated in Section 6 of this report. It is recommended that a flying-hour interval control be adopted if utilization is to be decreased below current levels. If increases in utilization are expected, the isochronal program is recommended. A 10 percent overrun should be allowed under flying-hour control, except for the engine inspection.

After adoption of the improved scheduled maintenance program, a new study should be conducted to extend the intervals of the improved inspection. Limitations in the existing data would not allow extension past 400 flying hours for major inspections.

The study methodology developed for VE12 can and should be applied to other aircraft currently operated by the US Air Force.

SECTION 9

RECOMMENDATIONS

During the course of the VE12 study, numerous ideas for improvement of the study methodology and Air Force operations have been suggested. This section contains descriptions of those ideas which Convair Aerospace believes merit further consideration by the Air Force.

9.1 FIELD TEST OF RECOMMENDED MAINTENANCE PROGRAM

In accordance with the conclusions of this study, it is recommended that a field test be conducted to determine the validity of the VE12 results and that a new scheduled maintenance program be adopted based on the results of the field test. The test program should be conducted with three F-106 squadrons for a period of 9 months, as discussed in Section 6.

The field test of the recommended maintenance program should be followed by a CIE (Controlled Interval Extension) program to test the impact of a longer major inspection interval. The CIE test should be conducted for at least one squadron.

It is recommended that Convair Aerospace assist in the implementation of the test program and in the gathering and analysis of data during the test.

9.2 APPLICATION OF STUDY METHODOLOGY TO OTHER SYSTEMS

Convair Aerospace recommends that the VE12 study methodology be applied to the scheduled maintenance programs of all aircraft currently operated by the US Air Force. In addition, we believe that a similar study should be performed on aircraft engines to determine the feasibility of extending the overhaul times, based on statistical analysis of historical data available on those engines.

9.3 DATA BANK IMPROVEMENT

It is recommended that off-equipment maintenance data be incorporated in data banks developed for VE12. This change would give a more complete picture of the maintenance problem (including some indication of shop workload) and would provide a more comprehensive data base from which to develop new scheduled maintenance programs.

The data bank programs should be revised to accept all work unit codes except for those specifically excepted (which would be tested as part of the input data). This would facilitate input to the programs and solve problems associated with work unit code changes during the data bank time period. During the performance of VE12

it was discovered that several WUCs which were obsolete when the data bank programs were assembled were screened out of the data bank. This problem could have been avoided had the bank accepted all codes except those specifically excepted (such as shop level codes).

9.4 AUTOMATION OF MAINTENANCE PROGRAM ANALYSIS PROCESS

The methodology for determining from the statistical analyses results those WUCs to be inspected (as defined by Figure 5-1 of the Phase II report, GDCA-AHD72-003, dated June 1972) should be automated. The search and sort of these WUCs for the original study was done manually because of scheduling limitations. Follow-on studies could be more easily accomplished if this process were computerized and certain other programs were streamlined to reduce running time and output volume, as discussed in Section 9.5.

9.5 RECOMMENDED IMPROVEMENTS IN STATISTICAL ANALYSES

Altogether six different types of statistical analyses were performed during Phase II. After processing the results of these tests and utilizing their output in the maintenance program analyses and cost and effectiveness analyses, certain improvements which should be made in the formulation of these tests became apparent.

The results of Task I (maintenance action frequencies by when discovered code and how malfunctioned code) proved to be very useful during this study. This statistical analysis could be improved, however, if the total calendar time and aircraft utilization in flying hours were input to the program and the program modified to calculate maintenance action per flight hour and unit calendar time rates by WDC and HMC from the maintenance action totals. In addition, the rates of fix-phase actions per inspection should be calculated from the inspection frequencies and maintenance action frequencies for the corresponding WDC. These results could then be used directly by NAM.

This task as well as Tasks II and III, the manhour and NORM hour per maintenance action analyses and the maintenance action interval analyses, should be modified to aggregate the data to the WUC-set level. In this way, the statistical analysis results could be used directly by the subsequent analyses without the need for additional processing, making automation of the whole evaluation process feasible. The WUC sets used in this study are listed in Table 9-1.

Although analysis of fix-phase manhours expended during the lesser inspections indicates that only a small percentage of total manhours recorded are fix-phase as opposed to look-phase manhours — less than 8% for pre- and post flights and 3% for special inspections — it is recommended that Task II be extended to derive the distribution of fix-phase manhours per fix-phase action for all types of inspections.

Table 9-1. WUC Set Definitions Used in Study

WUC Set No.	Description	WUC Set No.	Description
1	11J - All of 11J	28	46G - All of 46G
2	11K - All of 11K	29	46H - All of 46H
3	11 - All of 11 except 11J, 11K	30	46J - All of 46J
4	12B - All of 12B	31	46 - All except 46A, C, G, H & J
5	12 - All of 12 except 12B	32	47 - All
6	13C - All of 13C	33	49A - All of 49A
7	13J - All of 13J	34	49 - All except 49A
8	13 - All except 13C, 13J	35	51 - All
9	14 - All	36	52 - All
10	23K - All of 23K	37	55 - All
11	23M - All of 23M	38	63 - All
12	23N - All of 23N	39	65 - All
13	23Q - All of 23Q	40	71 - All
14	23S - All of 23S	41	75 - All
15	23 - All except 23K, M, N, Q & S	42	93 - All
16	41F - All of 41F	43	97 - All
17	41 - All except 41F	44	74A - All of 74A
18	42E - All of 42E	45	74B - All of 74B
19	42F - All of 42F	46	74C - All of 74C
20	42G - All of 42G	47	74D - All of 74D
21	42 - All except 42E, F, & G	48	74F - All of 74F
22	44 - All	49	74H - All of 74H
23	45E - All of 45E	50	74K - All of 74K
24	45J - All of 45J	51	74L - All of 74L
25	45 - All of 45 except 45E & J	52	74P - All of 74P
26	46A - All of 46A	53	74Q - All of 74Q
27	46C - All of 46C	54	74000 - Only

In Task IV, linear regression analyses were performed for unscheduled maintenance actions per unit time versus time after the inspection and also for the aborts per sortie versus time after an inspection. The trend analyses, in which the scatter diagrams of these data were generated, indicate that a nonlinear regression analysis would be preferred, especially for these variables. It is recommended that the type of nonlinear regression analysis be determined and Task IV modified accordingly.

In addition, Task IV results indicate little or no impact on the abort rate subsequent to scheduled inspections. This result does not agree with other studies which have been made of this particular variable. Further study of scheduled inspection impact on aborts and AIEs is needed.

Certain improvements should be made in the effectiveness model to achieve greater realism in its representation of the impact of the maintenance program. The model should be modified to accept nonlinear regression results for unscheduled maintenance frequencies and aborts/sortie rates.

The structure of the model could be improved by calculating some of the variables over the whole maintenance program length rather than the value for each ΔI sub-interval. In particular, this change should be made for the calculation of special inspection NORM and manhours.

9.6 HIGH INFANT-MORTALITY ITEMS

Numerous items have been discovered which have a high infant mortality (more than 10% of the failures occurring in the first four flying hours subsequent to the previous maintenance action on that item). This high incidence of repeated maintenance, often as high as 30% to 40%, indicates either poor diagnosis, poor maintenance procedures, poor overhaul quality, or poor manuals. It is recommended that a study be conducted to determine the causes of and remedies for these high "infant mortality" rates. The printouts from statistical analysis Tasks III and V of VE12 indicate those items in the F-106 aircraft which should be investigated.

A study to determine the causes of this problem would involve review of current maintenance manuals and other technical data for those WUCs having a high incidence of repeated maintenance, high overall maintenance action frequency, high manhours per maintenance action, or high downtime per maintenance action. It would also be necessary to review the system design, quality of intermediate and depot level repair for these items, level of repair decisions, and skills and training requirements.

Potential maintenance cost savings are quite high if these causes can be determined. In the current maintenance program, 43% of the maintenance manhours are expended in unscheduled maintenance. If, as implied by some of the "infant mortality" data, as much as 20% of this is repeated maintenance that could be eliminated, then a $0.20 \times 43 = 8.6\%$ reduction in total maintenance manhours per year would be possible.

AD-A045 399

GENERAL DYNAMICS SAN DIEGO CALIF CONVAIR AEROSPACE DIV F/G 1/3
F-106 SCHEDULED MAINTENANCE STUDY. PHASE III. PREDICTIONS AND R--ETC(U)
SEP 72 L J BROWN, K E MARKS, G WANG
6DCA-AHD72-005 F41608-71-D-1383
NL

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This totals about \$1,030,000 savings annually for the F-106 fleet. Current NOR hours per clock hour for unscheduled maintenance are about 0.074. A 20% reduction in this rate would result in an availability increase of 0.015, which corresponds to about 4 aircraft out of 260 in the F-106 fleet.

The potential savings under the new maintenance program are equally great. It is predicted that under the new program 48% of the total maintenance manhours are for unscheduled maintenance, implying that a reduction in the repeated maintenance rate as above would result in a 9.6% reduction in maintenance manhours. This is equivalent to a savings of \$810,000 annually in addition to the savings of \$3,600,000 already estimated to result from implementation of the recommended maintenance program. Furthermore, 31% of the NOR hours under the new program are estimated to be unscheduled or about 0.06 NOR hours per hour. A 20% reduction in this rate corresponds to a 0.012 increase in availability or about 3 aircraft in addition to the 10 aircraft already estimated to be gained by implementing the new program.

These, of course, are very rough estimates of the cost and effectiveness improvements to be derived by a study of the "infant mortality" problem. Considering that there is also some impact on repair actions performed during scheduled inspections, it is possible that the potential savings are even greater.

9.7 HIGH MAINTENANCE FREQUENCY ITEMS

It is recommended that a study be conducted to provide the Air Force with the capability to identify, by serial number, those high-value items which have a maintenance time-history indicating significantly higher than average maintenance actions such as removal, installation, etc. The study should develop a software package with a quick response capability to provide a printout of specific serial number items by how malfunctioned code and maintenance action dates to notify the operational unit of a possible requirement for depot level maintenance for the item.

For example, a specific inertial platform item is found to have a removal frequency for a certain type of malfunction significantly higher than the rate for the population of this type of item. The output of this program could alert the squadron to this situation, indicating the need to send this particular item to the depot for diagnostic teardown.

This type of program would be of great assistance in reducing the infant mortality rates.

9.8 RELIABILITY AND MAINTAINABILITY ANALYSES

The study methodology should be revised to include formal Failure Modes and Effects Analyses (FMEAs) and Maintainability Analyses (MAs). The data from these analyses

are required to maximize the savings produced by this study. When this methodology is utilized to improve the scheduled maintenance programs for other aircraft, FMEAs and MAs should be furnished as part of the data package.

9.9 AIR FORCE DATA SYSTEM PROBLEMS

Numerous recording errors have been discovered in the AFM 66-1 data. Particular problem areas include incorrect recording of the units of work, number of preflights and basic postflights, work unit code, and aircraft tail number. Extensive data screening programs were required to avoid using these data in the statistical analyses.

Several recommendations are offered for improvement of this situation. First, if the current system (AFM 66-1) is to be utilized without change, at least one man per squadron should be assigned the task of verifying the data collection accuracy at the squadron level. This man would check a sample of data records each month to ensure that the proper manhours, units of work, etc, are being recorded for the maintenance actually being accomplished.

Second, changes in the AFM 66-1 system to simplify data collection should be incorporated. As a minimum it is suggested that preprinted work cards be used to replace the 349 form. This card would have the work unit code and the most common How Malfunctioned Codes (HMC), When Discovered Codes (WDC), and Action Taken Codes (ATC) preprinted. The technician would select the card with the proper work unit code, fill in his name, aircraft serial number and time spent and circle the appropriate HMC, WDC and ATC. The basic principle here would be to minimize the amount of writing required of each maintenance man.

Another alternative would be to assign a career field for people to collect data for the maintenance management information system. These people would be solely responsible for all data records originating at the squadron level. This change would relieve the maintenance technician of any record-keeping duties and should significantly improve the accuracy of the data collected.

Additional studies performed using the VE12 methodology would benefit from increased utilization of squadron and aircraft records to supplement the current systems (AFM 66-1 and AFM 65-110). Use of these records would eliminate the problem of discovering the start/end dates of major inspections and would simplify the computer programs currently required to extract the information.

APPENDIX I

SOURCE LISTING — DECK CONVERSION PROGRAM

```

//T98978 JOB 01.' R LIVESAY ',PRTY=02,TYPRUN=HOLD,MSGLEVEL=)1,1*
//C98978 EXEC P9655L,TIME=01,ACCT=D35323007
//CHG.TU12 DD DISP=1,PASS*,UNIT=IT+F1,1,DEFER*,DSN*=A.9897333, CT12 1
// VOL=SER*=F1,LABEL=1,NL*
//CHG.TU22 DD DISP=1,PASS*,UNIT=IT+F5,1,DEFER*,DSN*=E.9897334, CT22 1
// VOL=SER*=F5,LABEL=1,NL*, CT22 2
// DCB=)RECFM=FB,LRECL=80,BLKSIZE=1600,DEN=2,TRTCH=ET* T22 3
//CHG.INPUT DD *,SPACE=)CYL,11,1** 1440 CDS
00000 COMBINE COMPILE G. WANG C98970
01000 IDENTIFICATION DIVISION. C98970
01010 PROGRAM-ID. C9897 C98970
01020 AUTHOR. G. N. WANG C98970
01030 INSTALLATION. GENERAL DYNAMICS/CONVAIR. C98970
01040 DATE-WRITTEN. 2 MAR 72. C98970
01050 REMARKS. C98970
01060 REFORMATS COBOL DECKS FOR KAFB 360 AND 7080. C98970
02000 ENVIRONMENT DIVISION. C98970
02010 CONFIGURATION SECTION. C98970
02020 SOURCE-COMPUTER. IBM-360. C98970
02030 OBJECT-COMPUTER. IBM-360. C98970
02100 INPUT-OUTPUT SECTION. C98970
02110 FILE-CONTROL. C98970
02120 SELECT CARD-IN-FILE ASSIGN TO UT-S-TU12 C98970
02130 RESERVE 1 ALTERNATE AREA. C98970
02140 SELECT MESSAGE-FILE ASSIGN TO DA-S-DT02 C98970
02150 RESERVE 1 ALTERNATE AREA. C98970
02160 SELECT CARD-OUT-FILE ASSIGN TO UT-S-TU22 C98970
02170 RESERVE 1 ALTERNATE AREA. C98970
10000 DATA DIVISION. C98970
10010 FILE SECTION. C98970
11100 FD CARD-IN-FILE C98970
11120 RECORDING MODE IS F C98970
11130 BLOCK CONTAINS 01 RECORDS C98970
11140 RECORD CONTAINS 80 CHARACTERS C98970
11150 LABEL RECORDS ARE STANDARD C98970
11160 DATA RECORDS ARE CARD-IN-REC. C98970
12000 01 CARD-IN-REC SYNC. C98970
12100 02 FILLER PICTURE X180*. C98970
12100 FD MESSAGE-FILE C98970
12120 RECORDING MODE IS F C98970
12130 BLOCK CONTAINS 20 RECORDS C98970
12140 RECORD CONTAINS 80 CHARACTERS C98970
12150 LABEL RECORDS ARE STANDARD C98970
12160 DATA RECORDS ARE MSG-REC. C98970
12200 01 MSG-REC SYNC. C98970
12210 02 FILLER PICTURE X180*. C98970
13100 FD CARD-OUT-FILE C98970
13120 RECORDING MODE IS F C98970
13130 BLOCK CONTAINS 20 RECORDS C98970
13140 RECORD CONTAINS 80 CHARACTERS C98970
13150 LABEL RECORDS ARE OMITTED C98970
13160 DATA RECORDS ARE CARD-OUT-REC. C98970
13200 01 CARD-OUT-REC SYNC. C98970
13210 02 FILLER PICTURE X180*. C98970
30000 WORKING-STORAGE SECTION. C98970
30010 01 CARD-DATA-IN SYNC. C98970
30020 02 COL OCCURS 80 TIMES PICTURE X. C98970
30030 01 FILLER REDEFINES CARD-DATA-IN. C98970
30040 02 COMP-360 PICTURE XXX. C98970
30050 02 FILLER PICTURE X177*. C98970
30060 01 FILLER REDEFINES CARD-DATA-IN. C98970
30070 02 COMP-7080 PICTURE X14*. C98970
30080 02 FILLER PICTURE X176*. C98970
30090 01 FILLER REDEFINES CARD-DATA-IN. C98970
30092 02 LINE-NUMBER-OUT PICTURE 915*. C98970
30094 02 FILLER PICTURE X175*. C98970
30096 01 FILLER REDEFINES CARD-DATA-IN SYNC. C98970
30097 02 COBOL-DATA PICTURE X172*. C98970
30098 02 PROG-IDENTIFICATION PICTURE X18*. C98970
30100 01 CARD-DATA-OUT SYNC. C98970
30120 02 CARD-IMAGE PICTURE X172*. C98970
30122 02 NEW-PROG-ID PICTURE X18*. C98970
30160 01 LINE-NUMBLR COMPUTATIONAL PICTURE S915* SYNC VALUE ZERO. C98970
30200 01 CHANGE-YES PICTURE XXX VALUE '***'. C98970
30210 01 TYPE-CO PICTURE 9 VALUE ZERO. C98970
30220 01 FIVE PICTURE X VALUE '5'. C98970
30230 01 S PICTURE A VALUE 'S'. C98970
30240 01 Y PICTURE A VALUE 'Y'. C98970
30250 01 N PICTURE A VALUE 'N'. C98970
30260 01 C PICTURE A VALUE 'C'. C98970
30270 01 DOT PICTURE X VALUE '.'. C98970
30280 01 RT-PARN PICTURE X VALUE '('. C98970
30290 01 LT-PARN PICTURE X VALUE ')'. C98970
30300 01 APOS PICTURE X VALUE QUOTE. C98970
30310 01 PLUS PICTURE X VALUE '+'. C98970
30320 01 EQ PICTURE X VALUE '='. C98970
30330 01 LT PICTURE X VALUE '<'. C98970

```

30340	01	PERCENT	PICTURE X	VALUE '1'.	C98970
30350	01	COM-AT	PICTURE X	VALUE '1'.	C98970
30360	01	AMP	PICTURE X	VALUE '1'.	C98970
30370	01	NUM-SIGN	PICTURE X	VALUE '1'.	C98970
30380	01	KNT	COMP	PICTURE 99.	C98970
30390	01	KNT1	COMP	PICTURE 99.	C98970
30400	01	KNT2	COMP	PICTURE 99.	C98970
30410	01	KNT3	COMP	PICTURE 99.	C98970
30420	01	KNT4	COMP	PICTURE 99.	C98970
30700	01	MSG-DOT SYNC.			C98970
30710	02	FILLER	PICTURE X150*	VALUE	C98970
30720				' PREVIOUS CHAR PROIR TO SYNC NOT LOCATED	C98970
30730	02	FILLER	PICTURE X130*	VALUE SPACE.	C98970
30800	01	C-360	PICTURE XXX	VALUE '360'.	C98970
30810	01	C-7080	PICTURE X14*	VALUE '7080'.	C98970
30820	01	TEMP	PICTURE X.		C98970
30900	01	MSG-360 SYNC.			C98970
30910	02	FILLER	PICTURE X130*	VALUE	C98970
30920				' OUTPUT FORMAT FOR KAFB 360. '.	C98970
30930	02	FILLER	PICTURE X150*	VALUE SPACE.	C98970
31000	01	MSG-7080 SYNC.			C98970
31010	02	FILLER	PICTURE X130*	VALUE	C98970
31020				' OUTPUT FORMAT FOR KAFB 7080. '.	C98970
31030	02	FILLER	PICTURE X150*	VALUE SPACE.	C98970
31100	01	MSG-FAIL SYNC.			C98970
31110	02	FILLER	PICTURE X130*	VALUE	C98970
31120				' NO COMPUTER SPEC ON INPUT. '.	C98970
31130	02	FILLER	PICTURE X150*	VALUE SPACE.	C98970
31200	01	DOLLAR-REC SYNC.			C98970
31210	02	FILLER	PICTURE X140*	VALUE	C98970
31220				'59897J60 TC7279-00 PCH-4	C98970
31230	02	FILLER	PICTURE X149*	VALUE SPACE.	C98970
31240	02	FILLER	PICTURE X	VALUE '2'.	C98970
50000		PROCEDURE DIVISION.			C98970
50010		OPEN-FILES.			C98970
50020		OPEN INPUT CARD-IN-FILE.			C98970
50030		OPEN OUTPUT MESSAGE-FILE, CARD-OUT-FILE.			C98970
50100		READ CARD-IN-FILE AT END GO TO CLOSE-FILES.			C98970
50105		MOVE CARD-IN-REC TO CARD-DATA-IN.			C98970
50106		NEXT-DECK.			C98970
50107		MOVE ZERO TO LINE-NUMBER.			C98970
50108		MOVE PROG-IDENTIFICATION TO NEW-PROG-ID.			C98970
50110		IF COMP-360 IS EQUAL TO C-360 GO TO MSG-1.			C98970
50120		IF COMP-7080 IS EQUAL TO C-7080 GO TO MSG-2.			C98970
50130		WRITE MSG-REC FROM MSG-FAIL.			C98970
50140		GO TO CLOSE-FILES.			C98970
50200		MSG-1.			C98970
50210		WRITE MSG-REC FROM MSG-360.			C98970
50220		MOVE 1 TO TYPE-CO.			C98970
50230		GO TO READ-CARD.			C98970
50300		MSG-2.			C98970
50310		WRITE MSG-REC FROM MSG-7080.			C98970
50320		MOVE 2 TO TYPE-CO.			C98970
50330		GO TO READ-CARD.			C98970
50400		READ-CARD.			C98970
50410		READ CARD-IN-FILE, AT END GO TO CLOSE-FILES.			C98970
50420		MOVE CARD-IN-REC TO CARD-DATA-IN.			C98970
50425		IF COL 16* IS EQUAL TO 'D' GO TO NEXT-DECK.			C98970
50440		PERFORM SET-LINE-NUMBER THRU END-SLN.			C98970
50450		IF COL 11*			C98970
50460		IS LESS THAN FIVE PERFORM LOOK-SYNC THRU END-L-S.			C98970
50470		IF TYPE-CO IS EQUAL 2 PERFORM CHANGE-CHAR THRU END-CC.			C98970
50480		IF TYPE-CO IS EQUAL TO 2 AND COL 11*			C98970
50482		IS NOT LESS THAN FIVE PERFORM LOOK-UPON-CONSOLE			C98970
50490		THRU END-LUC.			C98970
50500		MOVE COBOL-DATA TO CARD-IMAGE.			C98970
50510		WRITE CARD-OUT-REC FROM CARD-DATA-OUT.			C98970
50520		GO TO READ-CARD.			C98970
50600		CHANGE-CHAR.			C98970
50620		MOVE 11 TO KNT.			C98970
50630		C-C-1.			C98970
50640		ADD 1 TO KNT.			C98970
50650		MOVE COL 1KNT* TO TEMP.			C98970
50660		IF TEMP IS EQUAL TO RT-PARN GO TO C-C-2.			C98970
50670		IF TEMP IS EQUAL TO LT-PARN GO TO C-C-3.			C98970
50680		IF TEMP IS EQUAL TO APOS GO TO C-C-4.			C98970
50690		IF TEMP IS EQUAL TO PLUS GO TO C-C-5.			C98970
50700		IF TEMP IS EQUAL TO EQ GO TO C-C-6.			C98970
50710		C-C-7.			C98970
50720		IF KNT IS GREATER THAN 72 GO TO END-CC.			C98970
50730		GO TO C-C-1.			C98970
50800		C-C-2.			C98970
50810		MOVE LT TO COL 1KNT*.			C98970
50820		GO TO C-C-8.			C98970
50840		C-C-3.			C98970
50850		MOVE PERCENT TO COL 1KNT*.			C98970
50860		GO TO C-C-8.			C98970
50880		C-C-4.			C98970

50890	MOVE COM-AT TO COL JKNT*.	C98970
50900	GO TO C-C-8.	C98970
50920	C-C-5.	C98970
50930	MOVE AMP TO COL JKNT*.	C98970
50940	GO TO C-C-8.	C98970
50960	C-C-6.	C98970
50970	MOVE NUM-SIGN TO COL JKNT*.	C98970
50980	GO TO C-C-8.	C98970
51000	C-C-8.	C98970
51020	GO TO C-C-7.	C98970
51030	END-CC. EXIT.	C98970
51200	CLOSE-FILES.	C98970
51210	CLOSE CARD-IN-FILE WITH LOCK.	C98970
51220	MESSAGE-FILE WITH LOCK.	C98970
51230	CARD-OUT-FILE WITH LOCK.	C98970
51240	DISPLAY 'EOJ C9897' UPON CONSOLE.	C98970
51290	GOBACK.	C98970
51500	LOOK-SYNC.	C98970
51510	MOVE 11 TO KNT.	C98970
51520	L-S-1.	C98970
51530	ADD 1 TO KNT.	C98970
51540	IF COL JKNT* IS EQUAL TO 5 GO TO L-S-2.	C98970
51550	IF KNT IS LESS THAN 69 GO TO L-S-1.	C98970
51560	GO TO END-L-S.	C98970
51600	L-S-2.	C98970
51610	COMPUTE KNT1 = KNT . 1.	C98970
51620	IF COL JKNT1* IS NOT EQUAL TO Y GO TO L-S-1.	C98970
51630	COMPUTE KNT2 = KNT . 2.	C98970
51640	IF COL JKNT2* IS NOT EQUAL TO N GO TO L-S-1.	C98970
51650	COMPUTE KNT3 = KNT . 3.	C98970
51660	IF COL JKNT3* IS NOT EQUAL TO C GO TO L-S-1.	C98970
51670	COMPUTE KNT4 = KNT . 4.	C98970
51680	IF COL JKNT4* IS EQUAL TO DOT PERFORM ELIM-DOT THRU END-E-D.	C98970
51700	MOVE SPACE TO COL JKNT*.	C98970
51710	MOVE SPACE TO COL JKNT1*.	C98970
51720	MOVE SPACE TO COL JKNT2*.	C98970
51730	MOVE SPACL TO COL JKNT3*.	C98970
51740	MOVE 70 TO KNT.	C98970
51790	END-L-S. EXIT.	C98970
51800	ELIM-DOT.	C98970
51810	MOVE SPACE TO COL JKNT4*.	C98970
51820	MOVE KNT TO KNT4.	C98970
51830	E-D-1.	C98970
51840	SUBTRACT 1 FROM KNT4.	C98970
51850	IF KNT4 IS LESS THAN 12 GO TO E-D-2.	C98970
51860	IF COL JKNT4* IS EQUAL TO SPACE GO TO E-D-1.	C98970
51870	ADD 1 TO KNT4.	C98970
51880	MOVE DOT TO COL JKNT4*.	C98970
51890	GO TO END-E-D.	C98970
51900	E-D-2.	C98970
51910	WRITE MSG-REC FROM CARD-DATA-IN.	C98970
51920	WRITE MSG-REC FROM MSG-DOT.	C98970
51990	END-E-D. EXIT.	C98970
52000	SET-LINE-NUMBER.	C98970
52010	MOVE COL J1* TO TEMP.	C98970
52020	IF TEMP EQUAL TO '0' GO TO END-SLN.	C98970
52030	IF TEMP IS GREATER THAN '2' GO TO CHECK-LINE-3.	C98970
52040	IF LINE-NUMBER IS EQUAL TO ZERO MOVE 9990 TO LINE-NUMBER.	C98970
52050	ADD 10 TO LINE-NUMBER.	C98970
52060	GO TO MOVE-LINE-NUMBER.	C98970
52070	CHECK-LINE-3.	C98970
52080	IF TEMP IS GREATER THAN '4' GO TO CHECK-LINE-5.	C98970
52090	IF LINE-NUMBER IS LESS THAN 30000 MOVE 29990 TO LINE-NUMBER.	C98970
52100	ADD 10 TO LINE-NUMBER.	C98970
52110	GO TO MOVE-LINE-NUMBER.	C98970
52120	CHECK-LINE-5.	C98970
52130	IF LINE-NUMBER IS LESS THAN 50000 MOVE 49990 TO LINE-NUMBER.	C98970
52140	ADD 10 TO LINE-NUMBER.	C98970
52150	MOVE-LINE-NUMBER.	C98970
52160	MOVE LINE-NUMBER TO LINE-NUMBER-OUT.	C98970
52170	END-SLN. EXIT.	C98970
53000	LOOK-UPON-CONSOLE.	C98970
53010	MOVE 11 TO KNT.	C98970
53020	LUC-1.	C98970
53030	ADD 1 TO KNT.	C98970
53040	IF COL JKNT* IS NOT EQUAL TO 'U' GO TO LUC-ADD.	C98970
53045	COMPUTE KNT1 = KNT . 1.	C98970
53050	IF COL JKNT1* IS NOT EQUAL TO 'P' GO TO LUC-ADD.	C98970
53055	ADD 1 TO KNT1.	C98970
53060	IF COL JKNT1* IS NOT EQUAL TO 'O' GO TO LUC-ADD.	C98970
53065	ADD 1 TO KNT1.	C98970
53070	IF COL JKNT1* IS NOT EQUAL TO 'N' GO TO LUC-ADD.	C98970
53075	ADD 1 TO KNT1.	C98970
53080	IF COL JKNT1* IS NOT EQUAL TO ' ' GO TO LUC-ADD.	C98970
53085	ADD 1 TO KNT1.	C98970
53090	IF COL JKNT1* IS NOT EQUAL TO 'C' GO TO LUC-ADD.	C98970
53095	ADD 1 TO KNT1.	C98970
53100	IF COL JKNT1* IS NOT EQUAL TO '0' GO TO LUC-ADD.	C98970

53105	ADD 1 TO KNT1.		C98970
53110	IF COL JKNT1*	IS NOT EQUAL TO 'N' GO TO LUC-ADD.	C98970
53115	ADD 1 TO KNT1.		C98970
53120	IF COL JKNT1*	IS NOT EQUAL TO 'S' GO TO LUC-ADD.	C98970
53125	ADD 1 TO KNT1.		C98970
53130	IF COL JKNT1*	IS NOT EQUAL TO 'O' GO TO LUC-ADD.	C98970
53135	ADD 1 TO KNT1.		C98970
53140	IF COL JKNT1*	IS NOT EQUAL TO 'L' GO TO LUC-ADD.	C98970
53145	ADD 1 TO KNT1.		C98970
53150	IF COL JKNT1*	IS NOT EQUAL TO 'E' GO TO LUC-ADD.	C98970
53190	COMPUTE KNT2 = KNT - 1.		C98970
53200	LUC-2.		C98970
53210	ADD 1 TO KNT2.		C98970
53220	MOVE SPACE TO COL JKNT2*.		C98970
53230	IF KNT2 IS LESS THAN KNT1 GO TO LUC-2.		C98970
53235	COMPUTE KNT4 = KNT . 12.		C98970
53236	IF COL JKNT4* IS EQUAL TO DOT PERFORM ELIM-DOT THRU END-E-D.		C98970
53240	GO TO END-LUC.		C98970
53250	LUC-ADD.		C98970
53260	IF KNT IS LESS THAN 60 GO TO LUC-1.		C98970
53270	END-LUC. EXIT.		C98970
/*	PLACE COBOL SOURCE BEFORE THIS CARD		
//CHG.TFGIN	DD	*,SPACE=)CYL,))1,1**	1440 CDS
00000	GET TFG		C98970*T
010001 019999	REPLACE	WANG	'T
/*	PLACE TFG DATA BEFORE THIS CARD		
//TPR.TU12	DD	DISP=)OLD,KEEP*,VOL=SER=+F1,UNIT=T+F1,LABEL=),NL*	T12
//TPR.TU22	DD	DISP=)OLD,KEEP*,VOL=SER=+F5,UNIT=T+F5,LABEL=),NL*	T22
//TPR.TPRIN	DD	*,SPACE=)TRK,))1,1**	
T/P TU12	10110802080		
T/P DT02	10100802080		
/*	PLACE T/P CONTROL CARDS BEFORE THIS CARD		

APPENDIX II

SOURCE LISTING — MANHOUR AND NORM DATA PROGRAM (TASK VII)

```

//C9897K JOB 01: G. WANG 1,PMTY>02,TYPRUN>HOLD
//C9897K EXEC P9655L,TIME>02,ACCT>D35323007
//CHG.TU12 DU DISP>[PASS],UNIT>[A+F1,2,DEFER],DSN>+A.9897416, CT12/13 1
// VOL>SER>[+F1,A+F1,B+F1,C+F1,D+F1,E+F1,F+F1,G+F1,H+F1, CT12 2
// I+F1,J+F1,K+F1,L+F1,M+F1,N+F1,O+F1,P+F1,Q+F1,R+F1,S+F1] T12 3
//CHG.TU22 DU DISP>[PASS],UNIT>[A+F5,2,DEFER],DSN>+E.9897460, CT22/23 1
// VOL>SER>[+F5,A+F5,B+F5,C+F5,D+F5,E+F5,F+F5,G+F5,H+F5, CT22 2
// I+F5,J+F5,K+F5,L+F5,M+F5,N+F5,O+F5,P+F5,Q+F5,R+F5,S+F5] T22 3
//CHG.INPUT DU *.SPACE>[CYL,(1,1)] 1440 COS
00000 COMBINE COMPILE G. WANG. C98970
01040 DATE-WRITTEN. 27 JULY 72. C98970
01050 REMARKS. C98970
02000 ENVIRONMENT DIVISION. C98970
02010 CONFIGURATION SECTION. C98970
02020 SOURCE-COMPUTER. IBM-360. C98970
02030 OBJECT-COMPUTER. IBM-360. C98970
02100 INPUT-OUTPUT SECTION. C98970
02110 FILE-CONTROL. C98970
02120 SELECT IN-FILE-DB ASSIGN TO UT-S-TU12 C98970
02130 RESERVE 1 ALTERNATE AREA. C98970
02140 SELECT IN-FILE-ISC ASSIGN TO DA-S-DT01 C98970
02150 RESERVE 1 ALTERNATE AREA. C98970
02160 SELECT OUT-DATA ASSIGN TO UT-S-TU22 C98970
02170 RESERVE 1 ALTERNATE AREA. C98970
10000 DATA DIVISION. C98970
10010 FILE SECTION. C98970
10100 FD IN-FILE-DB C98970
10130 BLOCK CONTAINS 40 RECORDS C98970
10140 RECORD CONTAINS 70 CHARACTERS C98970
10150 LABEL RECORDS ARE OMITTED C98970
10160 DATA RECORDS ARE IN-REC-DB. C98970
10200 01 IN-REC-DB SYNC. C98970
10210 02 FILLER PICTURE X(70). C98970
11300 FD IN-FILE-ISC C98970
11320 RECORDING MODE IS F C98970
11330 BLOCK CONTAINS 20 RECORDS C98970
11340 RECORD CONTAINS 80 CHARACTERS C98970
11350 LABEL RECORDS ARE STANDARD C98970
11360 DATA RECORDS ARE IN-REC-ISC. C98970
11400 01 IN-REC-ISC SYNC. C98970
11410 02 FILLER PICTURE X(80). C98970
12100 FD OUT-DATA C98970
12120 RECORDING MODE IS F C98970
12130 BLOCK CONTAINS 60 RECORDS C98970
12140 RECORD CONTAINS 50 CHARACTERS C98970
12150 LABEL RECORDS ARE OMITTED C98970
12160 DATA RECORDS ARE TAPE-FILE. C98970
12170 TAPE-FILE SYNC PICTURE X(50). C98970
30000 STORAGE SECTION. C98970
30010 ISCHRONAL SYNC PICTURE X. C98970
30020 WDC-TEMP SYNC PICTURE X. C98970
30040 77 WEEK-TEMP SYNC PICTURE 999. C98970
30050 77 KNT SYNC COMPUTATIONAL PICTURE S999. C98970
30060 77 CUR-SN PICTURE X(8) VALUE SPACE. C98970
30070 77 P-WEEK PICTURE S999 COMPUTATIONAL. C98970
30080 77 P-FLT-HMS PICTURE S9(6) COMPUTATIONAL. C98970
30100 77 NO-WUC SYNC PICTURE 9999 VALUE ZERO. C98970
30170 77 CNT SYNC COMPUTATIONAL PICTURE S999. C98970
30400 77 ISC-TEMP SYNC PICTURE X(8) VALUE SPACE. C98970
30410 77 PREV-TESTED-SN SYNC PICTURE X(8) VALUE SPACE. C98970
30420 77 ISC-FLAG SYNC PICTURE X VALUE SPACE. C98970
30430 77 MIN-ISC-WEEK SYNC COMPUTATIONAL PICTURE S999 VALUE <999. C98970
30500 77 TEMP-WUC SYNC PICTURE X(5). C98970
30510 77 TEMP-COL-NO SYNC PICTURE S99 COMPUTATIONAL. C98970
30520 77 NO-WDC-COLS COMPUTATIONAL PICTURE S999 SYNC VALUE <21. C98970
30530 77 BF COMPUTATIONAL PICTURE S999 SYNC VALUE <23. C98970
30540 77 ONE SYNC PICTURE X VALUE !1. C98970
30550 77 TWO SYNC PICTURE X VALUE !2. C98970
30560 77 POS-WUC COMPUTATIONAL PICTURE S999. C98970
30570 77 ISC-TITLE-FLAG SYNC PICTURE X. C98970
30580 77 NI-TITLE-FLAG SYNC PICTURE X. C98970
30590 77 NI-LINE-FLAG SYNC PICTURE X. C98970
30600 77 ISC-LINE-FLAG SYNC PICTURE X. C98970
30610 77 PAGE-NUMBER-ISC PICTURE S99 SYNC VALUE ZERO. C98970
30615 77 PAGE-NUMBER-NI PICTURE S99 SYNC VALUE ZERO. C98970
30620 77 NO-REC-PRINT-ISC PICTURE 9(7) VALUE ZERO. C98970
30630 77 NO-REC-PRINT-NI PICTURE 9(7) VALUE ZERO. C98970
30640 77 NO-REC-TAPE PICTURE 9(7) VALUE ZERO. C98970
30650 77 NO-REC-TAPE-TI PICTURE 9(7) VALUE ZERO. C98970
30660 77 LINE-CNT-ISC COMPUTATIONAL PICTURE S999 SYNC. C98970
30670 77 LINE-CNT-NI COMPUTATIONAL PICTURE S999 SYNC. C98970
30680 77 LINE-PAGE COMPUTATIONAL PICTURE S999 VALUE <60 SYNC. C98970
30682 77 SUM-INDEX COMPUTATIONAL PICTURE S999 VALUE ZERO SYNC. C98970
30684 77 TEMP-INDEX COMPUTATIONAL PICTURE S999 VALUE ZERO SYNC. C98970
30686 77 NUMBER-SGWUC COMPUTATIONAL PICTURE S999 VALUE ZERO SYNC. C98970
30688 77 TWO-DIGIT-COL COMPUTATIONAL PICTURE S999 VALUE ZERO SYNC. C98970
31010 01 NO-ISC SYNC. C98970

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[illegible]

51100	NEXT-WUC.	C98970
51110	MOVE WUC TO CUR-WUC.	C98970
51150	ADD 1 TO NO-WUC.	C98970
51200	NEXT-HMC.	C98970
51210	MOVE HMC TO CUR-HMC.	C98970
51240	PERFORM CHECK-ISCHRONAL THRU END-CI.	C98970
51250	IF ISCHRONAL IS EQUAL TO ONE PERFORM ADD-ISC,	C98970
51260	ELSE PERFORM ADD-NI.	C98970
51300	READ-DATA.	C98970
51310	READ IN-FILE-DB INTO INPUT-DB.	C98970
51320	AT END GO TO CLOSE-TABLE.	C98970
51330	IF IDENT IS NOT EQUAL TO :4: GO TO READ-DATA.	C98970
51340	PERFORM PROC-WDC THRU END-PROC-WDC.	C98970
51350	IF POS-WDC IS EQUAL TO ZERO GO TO READ-DATA.	C98970
51360	PERFORM CHECK-ISCHRONAL THRU END-CI.	C98970
51370	IF WUC IS NOT EQUAL TO CUR-WUC GO TO OUTPUT-TABLE-END.	C98970
51380	IF HMC IS NOT EQUAL TO CUR-HMC GO TO OUTPUT-LINE.	C98970
51390	IF ISCHRONAL IS EQUAL TO ONE PERFORM ADD-ISC,	C98970
51400	ELSE PERFORM ADD-NI.	C98970
51490	GO TO READ-DATA.	C98970
51500	RESET-HMC-LINE-NI.	C98970
51510	MOVE ZERO TO CNT.	C98970
51520	RESET-HMC-LINE-1.	C98970
51530	ADD 1 TO CNT.	C98970
51550	MOVE ZERO TO HMC-NI [CNT].	C98970
51560	IF CNT IS LESS THAN NO-WDC-COLS GO TO RESET-HMC-LINE-1.	C98970
51590	END-RESET-NI. EXIT.	C98970
52000	PROC-WDC.	C98970
52010	MOVE ZERO TO POS-WDC.	C98970
52020	MOVE ZERO TO CNT.	C98970
52030	PROC-WDC-A.	C98970
52040	ADD 1 TO CNT.	C98970
52050	MOVE WDC-LIST [CNT] TO WDC-TEMP.	C98970
52060	IF WDC IS LESS THAN WDC-TEMP GO TO END-PROC-WDC.	C98970
52070	IF WDC IS EQUAL TO WDC-TEMP GO TO PROC-WDC-C.	C98970
52080	IF CNT IS LESS THAN NO-WDC-COLS GO TO PROC-WDC-A.	C98970
52100	PROC-WDC-C.	C98970
52110	MOVE CNT TO POS-WDC.	C98970
52190	END-PROC-WDC. EXIT.	C98970
52200	OUTPUT-LINE-OF-NI-DATA.	C98970
52300	MOVE ZERO TO HMC-FREQ-TOTAL-NI.	C98970
52310	MOVE ZERO TO CNT.	C98970
52320	SUM-NI-COL.	C98970
52330	ADD 1 TO CNT.	C98970
52340	MOVE SUM-WDC-COL [CNT] TO TEMP-INDEX.	C98970
52350	ADD HMC-NI [TEMP-INDEX] TO HMC-FREQ-TOTAL-NI.	C98970
52360	IF CNT IS LESS THAN SUM-INDEX GO TO SUM-NI-COL.	C98970
52370	MOVE TWO TO ISOCHRONAL.	C98970
52380	MOVE COL-NO [1] TO TEMP-INDEX.	C98970
52390	MOVE HMC-NI [TEMP-INDEX] TO MA-HPO.	C98970
52400	MOVE COL-NO [2] TO TEMP-INDEX.	C98970
52410	MOVE HMC-NI [TEMP-INDEX] TO MA-PE.	C98970
52420	MOVE HMC-FREQ-TOTAL-NI TO NUMA.	C98970
52430	IF MA-HPO IS EQUAL TO ZERO AND	C98970
52440	MA-PE IS EQUAL TO ZERO AND	C98970
52450	NUMA IS EQUAL TO ZERO GO TO END-OUTPUT-LINE-NI-DATA.	C98970
52520	WRITE TAPE-FILE FROM REC-OUT.	C98970
52530	ADD 1 TO NO-REC-TAPE.	C98970
52580	PERFORM RESET-HMC-LINE-NI THRU END-RESET-NI.	C98970
52590	END-OUTPUT-LINE-NI-DATA. EXIT.	C98970
52600	OUTPUT-LINE-OF-ISC-DATA.	C98970
52700	MOVE ZERO TO HMC-FREQ-TOTAL-ISC.	C98970
52710	MOVE ZERO TO CNT.	C98970
52720	SUM-ISC-COL.	C98970
52730	ADD 1 TO CNT.	C98970
52740	MOVE SUM-WDC-COL [CNT] TO TEMP-INDEX.	C98970
52750	ADD HMC-ISC [TEMP-INDEX] TO HMC-FREQ-TOTAL-ISC.	C98970
52760	IF CNT IS LESS THAN SUM-INDEX GO TO SUM-ISC-COL.	C98970
52770	MOVE ONE TO ISOCHRONAL.	C98970
52780	MOVE COL-NO [1] TO TEMP-INDEX.	C98970
52790	MOVE HMC-ISC [TEMP-INDEX] TO MA-HPO.	C98970
52800	MOVE COL-NO [2] TO TEMP-INDEX.	C98970
52810	MOVE HMC-ISC [TEMP-INDEX] TO MA-PE.	C98970
52820	MOVE HMC-FREQ-TOTAL-ISC TO NUMA.	C98970
52830	IF MA-HPO IS EQUAL TO ZERO AND	C98970
52840	MA-PE IS EQUAL TO ZERO AND	C98970
52850	NUMA IS EQUAL TO ZERO GO TO END-OUTPUT-LINE-ISC-DATA.	C98970
52920	WRITE TAPE-FILE FROM REC-OUT.	C98970
52930	ADD 1 TO NO-REC-TAPE.	C98970
52980	PERFORM RESET-HMC-LINE-ISC THRU END-RESET-ISC.	C98970
52990	END-OUTPUT-LINE-ISC-DATA. EXIT.	C98970
53000	OUTPUT-TABLE-END.	C98970
53040	PERFORM OUTPUT-LINE-OF-NI-DATA THRU END-OUTPUT-LINE-NI-DATA.	C98970
53300	PERFORM OUTPUT-LINE-OF-ISC-DATA THRU	C98970
53310	END-OUTPUT-LINE-ISC-DATA.	C98970

53481	CHECK-ID.	C98970
53485	IF IDENT IS EQUAL TO :9: GO TO CLOSE-FILES.	C98970
53490	GO TO NEXT-WUC.	C98970
53500	CLOSE-TABLE.	C98970
53510	MOVE :9: TO IDENT.	C98970
53520	GO TO OUTPUT-TABLE-END.	C98970
53700	OUTPUT-LINE.	C98970
53740	PERFORM OUTPUT-LINE-OF-NI-DATA THRU END-OUTPUT-LINE-NI-DATA.	C98970
53840	PERFORM OUTPUT-LINE-OF-ISC-DATA THRU	C98970
53850	END-OUTPUT-LINE-ISC-DATA.	C98970
53890	GO TO NEXT-HMC.	C98970
53900	RESET-HMC-LINE-ISC.	C98970
53910	MOVE ZERO TO CNT.	C98970
53920	RESET-HMC-LINE-2.	C98970
53930	ADD 1 TO CNT.	C98970
53940	MOVE ZERO TO HMC-ISC [CNT].	C98970
53950	IF CNT IS LESS THAN NO-WDC-COLS GO TO RESET-HMC-LINE-2.	C98970
53990	END-RESET-ISC. EXIT.	C98970
54000	ADD-NI.	C98970
54010	MOVE ONE TO NI-LINE-FLAG.	C98970
54020	ADD MA TO HMC-NI [POS-WDC].	C98970
54100	ADD-ISC.	C98970
54110	MOVE ONE TO ISC-LINE-FLAG.	C98970
54120	ADD MA TO HMC-ISC [POS-WDC].	C98970
55000	CLOSE-FILES.	C98970
55010	COMPUTE CNT > NO-REC-TAPE - NO-REC-TAPE / BF * BF.	C98970
55020	IF CNT IS EQUAL TO ZERO GO TO CF-3.	C98970
55030	CF-2.	C98970
55040	WRITE TAPE-FILE FROM NINE.	C98970
55050	ADD 1 TO CNT.	C98970
55060	IF CNT IS LESS THAN BF GO TO CF-2.	C98970
55140	CF-3.	C98970
55160	DISPLAY : NO TAPE RECS : NO-REC-TAPE UPON CONSOLE.	C98970
55165	DISPLAY : NO OF W.U.C. : NO-WUC UPON CONSOLE.	C98970
55190	DISPLAY : END OF JOB C9897 : UPON CONSOLE.	C98970
55200	CLOSE IN-FILE-DB.	C98970
55220	OUT-DATA.	C98970
55235	IN-FILE-ISC WITH LOCK.	C98970
55290	GORACK.	C98970
70000	READ-ISC-A-C.	C98970
70010	READ IN-FILE-ISC INTO NO-ISC AT END GO TO END-RIAC.	C98970
70020	MOVE ZERO TO KNT.	C98970
70030	RIAC.	C98970
70040	ADD 1 TO KNT.	C98970
70050	READ IN-FILE-ISC INTO ISC-A-C AT END GO TO END-RIAC.	C98970
70060	MOVE ISC-TN TO ISC-AC-TN [KNT].	C98970
70070	MOVE ISC-WK TO ISC-AC-WK [KNT].	C98970
70075	IF ISC-WK IS LESS THAN MIN-ISC-WEEK MOVE ISC-WK	C98970
70076	TO MIN-ISC-WEEK.	C98970
70080	IF KNT IS LESS THAN NO-ISC-AC GO TO RIAC.	C98970
70090	END-RIAC. EXIT.	C98970
70200	CHECK-ISCHRONAL.	C98970
70210	IF SERIAL-NO IS NOT EQUAL TO PREV-TESTED-SN GO TO CHECK-I-2.	C98970
70220	IF ISC-FLAG IS EQUAL TO TWO GO TO END-CI.	C98970
70230	IF ISCHRONAL IS EQUAL TO ONE AND WEEK IS NOT LESS THAN	C98970
70232	MIN-ISC-WEEK, THEN GO TO END-CI.	C98970
70240	CHECK-I-2.	C98970
70250	MOVE TWO TO ISCHRONAL.	C98970
70260	IF WEEK IS LESS THAN MIN-ISC-WEEK GO TO END-CI.	C98970
70270	MOVE ZERO TO CNT.	C98970
70280	CHECK-I-1.	C98970
70290	ADD 1 TO CNT.	C98970
70300	MOVE ISC-AC-TN [CNT] TO ISC-TEMP.	C98970
70310	IF SERIAL-NO IS LESS THAN ISC-TEMP GO TO CHECK-I-4.	C98970
70320	IF SERIAL-NO IS EQUAL TO ISC-TEMP GO TO CHECK-I-1A.	C98970
70330	IF CNT IS LESS THAN NO-ISC-AC GO TO CHECK-I-1.	C98970
70340	CHECK-I-4.	C98970
70350	MOVE TWO TO ISC-FLAG.	C98970
70360	GO TO CHECK-I-3.	C98970
70370	CHECK-I-1A.	C98970
70380	MOVE ISC-AC-WK [CNT] TO WEEK-TEMP.	C98970
70390	IF WEEK-TEMP IS EQUAL TO WEEK OR WEEK IS GREATER THAN	C98970
70400	WEEK-TEMP MOVE ONE TO ISCHRONAL.	C98970
70410	MOVE ONE TO ISC-FLAG.	C98970
70430	CHECK-I-3.	C98970
70440	MOVE SERIAL-NO TO PREV-TESTED-SN.	C98970
70450	END-CI. EXIT.	C98970
80000	READ-IN-TITLE-DATA.	C98970
80010	MOVE ZERO TO CNT.	C98970
80020	READ-WDC-INPUT.	C98970
80030	READ IN-FILE-ISC INTO WDC-INPUT.	C98970
80040	AT END GO TO END-RITD.	C98970
80050	ADD 1 TO CNT.	C98970
80060	MOVE WDC-IN TO WDC-LIST [CNT].	C98970
80080	IF CNT IS LESS THAN 21 GO TO READ-WDC-INPUT.	C98970
80100	READ-UNSCHEU-MAINT-COLS.	C98970
80110	READ IN-FILE-ISC INTO NUMBER-CARD.	C98970
80120	AT END GO TO END-RITD.	C98970

80130	MOVE NUMBER-ITEMS TO SUM-INDEX.	C98970
80140	MOVE ZERO TO CNT.	C98970
80150	READ-UNSCHED-COLS.	C98970
80160	READ IN-FILE-ISC INTO NUMBER-CARD,	C98970
80170	AT END GO TO END-RITD.	C98970
80180	ADD 1 TO CNT.	C98970
80190	MOVE NUMBER-ITEMS TO SUM-WDC-COL [CNT].	C98970
80200	IF CNT IS LESS THAN SUM-INDEX GO TO READ-UNSCHED-COLS.	C98970
80290	MOVE ZERO TO CNT	C98970
80300	READ IN-FILE-ISC INTO NUMBER-CARD,	C98970
80310	AT END GO TO END-RITD.	C98970
80320	MOVE NUMBER-ITEMS TO NUMBER-SGWUC.	C98970
80330	READ-SGWUC-DATA.	C98970
80340	READ IN-FILE-ISC INTO NUMBER-CARD,	C98970
80350	AT END GO TO END-RITD.	C98970
80360	ADD 1 TO CNT.	C98970
80370	MOVE NUMBER-ITEMS TO COL-NO [CNT].	C98970
80380	MOVE INPUT-SG-CODE TO SG-WUC [CNT].	C98970
80390	IF CNT IS LESS THAN NUMBER-SGWUC GO TO READ-SGWUC-DATA.	C98970
80790	END-RITD. EXIT.	C98970
/* PLACE COBOL SOURCE BEFORE THIS CARD		
//CHG.TFGIN	DU *SPACE*[CYL,[1:1]]	1440 CDS
00000	GET TFG	C98970 T
010001 019999	REPLACE	17
TFG DT01	11 0202080	

34
57000236 331
57000237 331
57000243 324
57000244 331
57002545 331
58000776 324
58000901 331
59000002 331
59000003 331
59000005 331
59000006 331
59000010 331
59000012 331
59000015 331
59000018 331
59000019 331
59000026 331
59000030 331
59000054 324
59000057 324
59000058 324
59000059 324
59000104 331
59000105 331
59000108 324
59000110 324
59000119 324
59000141 324
59000143 324
59000144 324
59000145 324
59000147 324
59000151 324
59000152 324

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4

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5
6
15
19
20
2
10 03300
11 03400
*END
/* PLACE TFG DATA BEFORE THIS CARD
//TPR,TU12 DU DISP>[OLD,KEEP],VOL>SER>+F1,UNIT>T+F1 T12
//TPR,TU22 DU DISP>[OLD,KEEP],VOL>SER>+F5,UNIT>T+F5 T22
//TPR,TPRIN DU *,SPACE>[THK,[1,1]]
T/P DT01 10100002080
T/P TU22 10100502050
/* PLACE T/P CONTROL CARDS BEFORE THIS CARD

//T9897N JOB 01: G WANG 1,PRTY>02,TYPRUN>HOLD
//C9897B EXEC P9655L,TIME>15,ACCT>D35323007
//CHG,TU14 DU DISP>[PASS],UNIT>[T+F3,1,DEFER],DSN>+C.9897416, CT14
// VOL>SER>[+F3,A+F3,B+F3,C+F3,D+F3,E+F3,F+F3,G+F3,H+F3, CT14 2
// I+F3,J+F3,K+F3,L+F3,M+F3,N+F3,O+F3,P+F3,Q+F3,R+F3,S+F3] T14 3
// //CHG,TU22 DU DISP>[PASS],UNIT>[T+F5,1,DEFER],DSN>+E.9897432, CT22 1
// VOL>SER>[+F5,A+F5,B+F5,C+F5,D+F5,E+F5,F+F5,G+F5,H+F5, CT22 2
// I+F5,J+F5,K+F5,L+F5,M+F5,N+F5,O+F5,P+F5,Q+F5,R+F5,S+F5] T22 3
// //CHG,TU24 DU DISP>[PASS],UNIT>[T+F7,1,DEFER],DSN>+G.9897429, CT24 1
// VOL>SER>[+F7,A+F7,B+F7,C+F7,D+F7,E+F7,F+F7,G+F7,H+F7, CT24 2
// I+F7,J+F7,K+F7,L+F7,M+F7,N+F7,O+F7,P+F7,Q+F7,R+F7,S+F7] T24 3
//CHG,INPUT DU *,SPACE>[CYL,[1,1]] 1440 CDS
00000 COMPILE COMPILE G. WANG. C98970
01040 DATE-WRITTEN. 25 JULY 72. C98970
01050 REMARKS. C98970
01060 PHASE II PROGRAM C98970
01070 TASK 7-2A MANHOOR AND NORM DATA. C98970
02000 ENVIRONMENT DIVISION. C98970
02010 CONFIGURATION SECTION. C98970
02020 SOURCE-COMPUTER. IHM-360. C98970
02030 OBJECT-COMPUTER. IHM-360. C98970
02100 INPUT-OUTPUT SECTION. C98970
02110 FILE-CONTROL. C98970
02120 SELECT IN-FILE-D-B ASSIGN TO UT-S-TU14 C98970
02130 RESERVE 1 ALTERNATE AREA. C98970
02140 SELECT IN-FILE-ISC ASSIGN TO DA-S-DT01 C98970
02150 RESERVE 1 ALTERNATE AREA. C98970
02160 SELECT MSG-FILE ASSIGN TO DA-S-DT02 C98970
02170 RESERVE 1 ALTERNATE AREA. C98970
02180 SELECT OUT-FILE-1 ASSIGN TO UT-S-TU24 C98970
02190 RESERVE 1 ALTERNATE AREA. C98970
02200 SELECT OUT-FILE-2 ASSIGN TO UT-S-TU22 C98970
02210 RESERVE 1 ALTERNATE AREA. C98970
10000 DATA DIVISION. C98970
10010 FILE SECTION. C98970
10100 FD IN-FILE-D-B C98970
10120 RECORDING MODE IS F C98970
10130 BLOCK CONTAINS 40 RECORDS C98970
10140 RECORD CONTAINS 70 CHARACTERS C98970
10150 LABEL RECORDS ARE OMITTED C98970
10160 DATA RECORDS ARE IN-REC-D-B. C98970
10200 01 IN-REC-D-B SYNC. C98970
10210 02 FILLER PICTURE X(70). C98970
10220 C98970
11300 FD IN-FILE-ISC C98970
11320 RECORDING MODE IS F C98970
11330 BLOCK CONTAINS 20 RECORDS C98970
11340 RECORD CONTAINS 80 CHARACTERS C98970
11350 LABEL RECORDS ARE STANDARD C98970
11360 DATA RECORDS ARE IN-REC-ISC. C98970
11400 01 IN-REC-ISC SYNC. C98970
11410 02 FILLER PICTURE X(80). C98970
12100 FD, OUT-FILE-1 C98970
12120 RECORDING MODE IS F C98970
12130 BLOCK CONTAINS 90 RECORDS C98970
12140 RECORD CONTAINS 20 CHARACTERS C98970
12150 LABEL RECORDS ARE OMITTED C98970
12160 DATA RECORDS ARE OUT-REC-1. C98970
12200 01 OUT-REC-1 SYNC. C98970
12210 02 FILLER PICTURE X(20). C98970
13300 FD MSG-FILE C98970
13320 RECORDING MODE IS F C98970
13330 BLOCK CONTAINS 20 RECORDS C98970
13340 RECORD CONTAINS 80 CHARACTERS C98970
13350 LABEL RECORDS ARE STANDARD C98970
13360 DATA RECORDS ARE MSG-REC. C98970
13400 01 MSG-REC SYNC. C98970
13410 02 FILLER PICTURE X(80). C98970
14100 FD OUT-FILE-2 C98970
14120 RECORDING MODE IS F C98970

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32000	01	SPEC-WUC SYNC.		C98970
32010	05	CI-HPF	PICTURE XI5J.	C98970
32020	05	CI-NA1-1	PICTURE XI5J.	C98970
32030	05	CI-NA1-2	PICTURE XI5J.	C98970
32040	05	CI-NA1-3	PICTURE XI5J.	C98970
32050	05	CI-PERI	PICTURE XI5J.	C98970
32060	05	CI-IRAN	PICTURE XI5J.	C98970
32070	05	CI-REFLT	PICTURE XI5J.	C98970
32080	05	CI-BPOST	PICTURE XI5J.	C98970
32090	05	CI-SHPOST	PICTURE XI5J.	C98970
32100	05	GAP-WK-1	PICTURE 99.	C98970
32110	05	GAP-WK-2	PICTURE 99.	C98970
32120	05	FILLER	PICTURE XI31J.	C98970
50000		PROCEDURE DIVISION.		C98970
50010		OPEN-FILES.		C98970
50020		OPEN INPUT IN-FILE-D-B, IN-FILE-ISC.		C98970
50030		OPEN OUTPUT MSG-FILE.		C98970
50040		OPEN OUTPUT OUT-FILE-1, OUT-FILE-2.		C98970
50050		PERFORM READ-ISC-A-C THRU END-RIAC.		C98970
50060		READ-INITIAL.		C98970
50070		READ IN-FILE-D-B INTO DATA-BANK-INPUT.		C98970
50080		AT END GO TO CLOSE-FILES.		C98970
50100		CHECK-DATA.		C98970
50120		IF IDENT IS EQUAL TO 3 AND WUC-2 IS EQUAL TO 103: GO TO		C98970
50130		PROC-II-1.		C98970
50140		IF IDENT IS EQUAL TO 3 AND WUC-2 IS EQUAL TO 104: GO TO		C98970
50150		PROC-II-1.		C98970
50160		IF IDENT IS EQUAL TO 3 AND WUC-2 IS GREATER THAN 109: GO TO		C98970
50170		PROC-II-2A.		C98970
50180		IF IDENT IS EQUAL TO 4 GO TO PROC-II-2B.		C98970
50190		GO TO READ-INITIAL.		C98970
50200		PROC-II-1.		C98970
50210		PERFORM CHECK-ISCHRONAL THRU END-CI.		C98970
50220		MOVE ISCHRONAL TO CUR-ISC.		C98970
50222		MOVE IDENT TO CUR-ID.		C98970
50230		MOVE WUC TO CURWUC.		C98970
50240		MOVE WEEK TO CURWEEK.		C98970
50250		MOVE SERIAL-NO TO CUR-SER-NO.		C98970
50251		MOVE FLT-HRS TO CUR-FLT-HRS.		C98970
50252		MOVE TWO TO CUR-65.		C98970
50253		IF NORM-HR LESS THAN ZERO MOVE ONE TO CUR-65.		C98970
50260		INIT-SET.		C98970
50270		MOVE ONE TO FLT-FLAG.		C98970
50271		IF WUC EQUAL TO CI-PREFLT MOVE TWO TO FLT-FLAG.		C98970
50272		IF WUC EQUAL TO CI-BPOST MOVE TWO TO FLT-FLAG.		C98970
50273		IF WUC EQUAL TO CI-SHPOST MOVE TWO TO FLT-FLAG.		C98970
50274		COMPUTE SUM-NORM > 0.		C98970
50275		IF FLT-FLAG EQUAL TO ONE AND NORM-HR GREATER THAN ZERO		C98970
50276		MOVE NORM-HR TO SUM-NORM.		C98970
50280		MOVE MAN-HR TO SUM-MAN-HR.		C98970
50290		ACC-SET.		C98970
50300		READ IN-FILE-D-B INTO DATA-BANK-INPUT		C98970
50310		AT END GO TO CLOSE-FILES.		C98970
50315		PERFORM CHECK-ISCHRONAL THRU END-CI.		C98970
50320		IF ISCHRONAL IS NOT EQUAL TO CUR-ISC GO TO SET-BREAK.		C98970
50322		IF IDENT NOT EQUAL TO CUR-ID GO TO SET-BREAK.		C98970
50330		IF WUC NOT EQUAL TO CURWUC GO TO SET-BREAK.		C98970
50340		IF SERIAL-NO NOT EQUAL TO CUR-SER-NO GO TO SET-BREAK.		C98970
50345		MOVE TWO TO DATA-65.		C98970
50346		IF NORM-HR LESS THAN ZERO MOVE ONE TO DATA-65.		C98970
50347		GO TO CHECK-TYPE.		C98970
50348		NOT-SP-TYPE.		C98970
50350		SUBTRACT CURWEEK FROM WEEK GIVING WEEK-TEMP.		C98970
50360		IF WEEK-TEMP NOT EQUAL TO 1		C98970
50370		GO TO INTERNAL-BREAK.		C98970
50380		ADD MAN-HR TO SUM-MAN-HR.		C98970
50385		MOVE ONE TO FLT-FLAG.		C98970
50390		IF WUC EQUAL TO CI-PREFLT MOVE TWO TO FLT-FLAG.		C98970
50400		IF WUC EQUAL TO CI-BPOST MOVE TWO TO FLT-FLAG.		C98970
50410		IF WUC EQUAL TO CI-SHPOST MOVE TWO TO FLT-FLAG.		C98970
50420		IF FLT-FLAG EQUAL TO ONE AND NORM-HR GREATER THAN ZERO		C98970
50421		ADD NORM-HR TO SUM-NORM.		C98970
50425		IF FLT-FLAG EQUAL TO TWO COMPUTE SUM-NORM > 0.		C98970
50440		MOVE WEEK TO CURWEEK.		C98970
50442		MOVE FLT-HRS TO CUR-FLT-HRS.		C98970
50443		IF CUR-65 EQUAL TO TWO OR DATA-65 EQUAL TO TWO		C98970
50444		MOVE TWO TO CUR-65.		C98970
50446		MOVE IDENT TO CUR-ID.		C98970
50450		GO TO ACC-SET.		C98970
50460		SET-BREAK.		C98970
50470		PERFORM WRITE-1 THRU END-WRITE-1.		C98970
50472		COMPUTE SUM-NORM > 0.		C98970
50474		COMPUTE SUM-MAN-HR > 0.		C98970
50480		GO TO CHECK-DATA.		C98970
50490		INTERNAL-BREAK.		C98970
50500		PERFORM WRITE-1 THRU END-WRITE-1.		C98970
50510		MOVE WEEK TO CURWEEK.		C98970

50512	MOVE FLI-HRS TO CUR-FLI-HRS.	C98970
50515	MOVE DATA-65 TO CUR-65.	C98970
50516	MOVE IDENT TO CUR-ID.	C98970
50520	GO TO INIT-SET.	C98970
50530	NOTE WRITE NORM-HR AND MAN-HR TOTALS ON OUTPUT FILE.	C98970
50540	WRITE-1.	C98970
50660	END-WRITE-1. EXIT.	C98970
51000	CHECK-TYPE.	C98970
51010	MOVE ONE TO WUC-FLAG.	C98970
51020	IF WUC EQUAL TO CI-HPF MOVE TWO TO WUC-FLAG.	C98970
51030	IF WUC EQUAL TO CI-MA1-1 MOVE TWO TO WUC-FLAG.	C98970
51040	IF WUC EQUAL TO CI-MA1-2 MOVE TWO TO WUC-FLAG.	C98970
51050	IF WUC EQUAL TO CI-MA1-3 MOVE TWO TO WUC-FLAG.	C98970
51060	IF WUC EQUAL TO CI-PERI MOVE TWO TO WUC-FLAG.	C98970
51070	IF WUC EQUAL TO CI-IRAN MOVE TWO TO WUC-FLAG.	C98970
51080	IF WUC-FLAG EQUAL TO ONE GO TO NOT-SP-TYPE.	C98970
51090	SUBTRACT CURWEEK FROM WEEK GIVING WEEK-TEMP.	C98970
51100	SP-TYPE.	C98970
51110	IF WUC LESS THAN CI-PERI AND WEEK-TEMP GREATER THAN GAP-WK-1	C98970
51111	GO TO INTERNAL-BREAK.	C98970
51120	IF WUC GREATER THAN CI-MA1-3 AND WEEK-TEMP GREATER THAN	C98970
51121	GAP-WK-2 GO TO INTERNAL-BREAK.	C98970
51132	ADD MAN-HR TO SUM-MAN-HR.	C98970
51134	IF NORM-HR GREATER THAN ZERO ADD NORM-HR TO SUM-NORM.	C98970
51140	MOVE WEEK TO CUMWEEK.	C98970
51150	MOVE FLI-HRS TO CUR-FLI-HRS.	C98970
51152	IF DATA-65 EQUAL TO TWO OR CUR-65 EQUAL TO TWO	C98970
51153	MOVE TWO TO CUR-65.	C98970
51154	MOVE IDENT TO CUR-ID.	C98970
51160	GO TO ALC-SET.	C98970
55000	PROC-11-2A.	C98970
55010	PERFORM CHECK-ISCHRONAL THRU END-CI.	C98970
55020	MOVE ISCHRONAL TO CUR-ISC.	C98970
55030	MOVE WUC TO CURWUC.	C98970
55050	MOVE SERIAL-NO TO CUR-SER-NO.	C98970
55060	MOVE IDENT TO CUR-ID.	C98970
55070	PERFORM WRITE-2 THRU END-WRITE-2.	C98970
55072	MOVE TWO TO CUR-65.	C98970
55073	IF NORM-HR LESS THAN ZERO MOVE ONE TO CUR-65.	C98970
55075	SET-NEW.	C98970
55080	COMPUTE SUM-NORM > 0.	C98970
55081	IF NORM-HR GREATER THAN ZERO MOVE NORM-HR TO SUM-NORM.	C98970
55090	MOVE UNITS TO SUM-MA.	C98970
55092	IF UNITS EQUAL TO ZERO GO TO SET-FLAG.	C98970
55093	MOVE CURWUC TO WUC-OUT.	C98970
55094	MOVE CUR-ISC TO ISC-OUT.	C98970
55095	PERFORM WRITE-3 THRU END-WRITE-3.	C98970
55096	READ IN-FILE-D-B INTO DATA-BANK-INPUT AT END GO TO EOF-BRK.	C98970
55097	GO TO BREAK-1.	C98970
55100	SET-FLAG.	C98970
55130	READ IN-FILE-D-B INTO DATA-BANK-INPUT	C98970
55140	AT END GO TO EOF-BRK.	C98970
55150	PERFORM CHECK-ISCHRONAL THRU END-CI.	C98970
55160	IF IDENT EQUAL TO CUR-ID	C98970
55170	PERFORM WRITE-2 THRU END-WRITE-2.	C98970
55180	IF ISCHRONAL NOT EQUAL TO CUR-ISC GO TO BREAK-1.	C98970
55190	IF WUC NOT EQUAL TO CURWUC GO TO BREAK-1.	C98970
55200	IF SERIAL-NO NOT EQUAL TO CUR-SER-NO GO TO BREAK-1.	C98970
55210	IF IDENT NOT EQUAL TO CUR-ID GO TO BREAK-1.	C98970
55212	MOVE TWO TO DATA-65.	C98970
55213	IF NORM-HR LESS THAN ZERO MOVE ONE TO DATA-65.	C98970
55215	IF CUR-65 EQUAL TO TWO OR DATA-65 EQUAL TO TWO	C98970
55216	MOVE TWO TO CUR-65.	C98970
55220	IF NORM-HR GREATER THAN ZERO ADD NORM-HR TO SUM-NORM.	C98970
55230	ADD UNITS TO SUM-MA.	C98970
55231	IF UNITS NOT EQUAL TO ZERO GO TO INT-BREAK.	C98970
55232	GO TO SET-FLAG.	C98970
55240	INT-BREAK.	C98970
55250	MOVE CURWUC TO WUC-OUT.	C98970
55260	MOVE CUR-ISC TO ISC-OUT.	C98970
55270	PERFORM WRITE-3 THRU END-WRITE-3.	C98970
55280	COMPUTE SUM-NORM > 0.	C98970
55282	COMPUTE SUM-MA > 0.	C98970
55284	GO TO SET-FLAG.	C98970
55290	BREAK-1.	C98970
55322	COMPUTE SUM-NORM > 0.	C98970
55324	COMPUTE SUM-MA > 0.	C98970
55330	GO TO CHECK-DATA.	C98970
55390	WRITE-2.	C98970
55470	END-WRITE-2. EXIT.	C98970
55480	WRITE-3.	C98970
55482	IF CUR-65 EQUAL TO ONE GO TO END-WRITE-3.	C98970
55500	MOVE SPACE TO MMC-OUT.	C98970
55510	DIVIDE SUM-MA INTO SUM-NORM GIVING OBS.	C98970

55520	MOVE THREE TO DATA-TYPE.	C98970
55530	WRITE OUT-REC-2 FROM OUT-DATA.	C98970
55540	ADD 1 TO NO-REC-2.	C98970
55550	END-WRITE-3. EXIT.	C98970
55551	EOF-BRK.	C98970
55552	IF SUM-HORM EQUAL TO ZERO GO TO CLOSE-FILES.	C98970
55553	MOVE CURWUC TO WUC-OUT.	C98970
55554	MOVE CUR-ISC TO ISC-OUT.	C98970
55555	PERFORM WRITE-3 THRU END-WRITE-3.	C98970
55556	GO TO CLOSE-FILES.	C98970
55560	REMARK-2.	C98970
55570	NOTE COMPUTE RATIO OF MH TOTAL OVER MA TOTAL	C98970
55580	DATA BANK RECORD TYPE 4.	C98970
60000	PROC-II-2B.	C98970
60010	PERFORM CHECK-ISCHRONAL THRU END-CI.	C98970
60020	MOVE ISCHRONAL TO CUR-ISC.	C98970
60030	MOVE WUC TO CURWUC.	C98970
60050	MOVE SERIAL-NO TO CUR-SER-NO.	C98970
60060	MOVE IDENT TO CUR-ID.	C98970
60070	MOVE HMC TO CUR-HMC.	C98970
60080	SET-NEW-2.	C98970
60090	MOVE MAN-HR TO SUM-MAN-HR.	C98970
60100	MOVE UNITS TO SUM-MA.	C98970
60102	IF UNITS EQUAL TO ZERO GO TO SET-FLAG-2.	C98970
60103	PERFORM WRITE-4 THRU END-WRITE-4.	C98970
60104	READ IN-FILE-D-B INTO DATA-BANK-INPUT AT END GO TO EOF-BRK-2.	C98970
60105	GO TO BREAK-2.	C98970
60110	SET-FLAG-2.	C98970
60140	READ IN-FILE-D-B INTO DATA-BANK-INPUT	C98970
60150	AT END GO TO EOF-BRK-2.	C98970
60160	PERFORM CHECK-ISCHRONAL THRU END-CI.	C98970
60170	IF ISCHRONAL NOT EQUAL TO CUR-ISC GO TO BREAK-2.	C98970
60180	IF WUC NOT EQUAL TO CURWUC GO TO BREAK-2.	C98970
60190	IF SERIAL-NO NOT EQUAL TO CUR-SER-NO GO TO BREAK-2.	C98970
60200	IF IDENT NOT EQUAL TO CUR-ID GO TO BREAK-2.	C98970
60210	IF HMC NOT EQUAL TO CUR-HMC GO TO BREAK-2.	C98970
60220	ADD MAN-HR TO SUM-MAN-HR.	C98970
60230	ADD UNITS TO SUM-MA.	C98970
60231	IF UNITS NOT EQUAL TO ZERO GO TO INT-BREAK-2.	C98970
60232	GO TO SET-FLAG-2.	C98970
60240	INT-BREAK-2.	C98970
60250	PERFORM WRITE-4 THRU END-WRITE-4.	C98970
60260	COMPUTE SUM-MAN-HR > 0.	C98970
60262	COMPUTE SUM-MA > 0.	C98970
60264	GO TO SET-FLAG-2.	C98970
60270	BREAK-2.	C98970
60282	COMPUTE SUM-MAN-HR > 0.	C98970
60284	COMPUTE SUM-MA > 0.	C98970
60290	GO TO CHECK-DATA.	C98970
60330	WRITE-4.	C98970
60340	MOVE CURWUC TO WUC-OUT.	C98970
60350	MOVE CUR-ISC TO ISC-OUT.	C98970
60360	MOVE CUR-HMC TO HMC-OUT.	C98970
60370	IF SUM-MA EQUAL TO ZERO ADD 1 TO SUM-MA.	C98970
60380	DIVIDE SUM-MA INTO SUM-MAN-HR	C98970
60390	GIVING OBS.	C98970
60400	MOVE ONE TO DATA-TYPE.	C98970
60410	WRITE OUT-REC-1 FROM OUT-DATA.	C98970
60420	ADD 1 TO NO-REC-1.	C98970
60430	END-WRITE-4. EXIT.	C98970
60440	EOF-BRK-2.	C98970
60450	IF SUM-MAN-HR EQUAL TO ZERO GO TO CLOSE-FILES.	C98970
60460	PERFORM WRITE-4 THRU END-WRITE-4.	C98970
60470	GO TO CLOSE-FILES.	C98970
70000	READ-ISC-A-C.	C98970
70005	READ IN-FILE-ISC INTO SPEC-WUC AT END GO TO END-RIAC.	C98970
70010	READ IN-FILE-ISC INTO NO-ISC AT END GO TO END-RIAC.	C98970
70020	MOVE ZERO TO KNT.	C98970
70030	RIAC.	C98970
70040	ADD 1 TO KNT.	C98970
70050	READ IN-FILE-ISC INTO ISC-A-C AT END GO TO END-RIAC.	C98970
70060	MOVE ISC-TN TO ISC-AC-TN (KNT).	C98970
70070	MOVE ISC-WK TO ISC-AC-WK (KNT).	C98970
70075	IF ISC-WK IS LESS THAN MIN-ISC-WEEK MOVE ISC-WK	C98970
70076	TO MIN-ISC-WEEK.	C98970
70080	IF KNT IS LESS THAN NO-ISC-AC GO TO RIAC.	C98970
70085	CLOSE IN-FILE-ISC WITH LOCK.	C98970
70090	END-RIAC. EXIT.	C98970
70200	CHECK-ISCHRONAL.	C98970
70210	IF SERIAL-NO IS NOT EQUAL TO PREV-TESTED-SN GO TO CHECK-I-2.	C98970
70220	IF ISC-FLAG IS EQUAL TO TWO GO TO END-CI.	C98970
70230	IF ISCHRONAL IS EQUAL TO ONE AND WEEK IS NOT LESS THAN	C98970
70232	MIN-ISC-WEEK, THEN GO TO END-CI.	C98970
70240	CHECK-I-2.	C98970
70250	MOVE TWO TO ISCHRONAL.	C98970
70260	IF WEEK IS LESS THAN MIN-ISC-WEEK GO TO END-CI.	C98970
70270	MOVE ZERO TO CNT.	C98970

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70280 CHECK-I-1. C98970
70290 ADD 1 TO CNT. C98970
70300 MOVE ISC-AC-TN (CNT) TO ISC-TEMP. C98970
70310 IF SERIAL-NO IS LESS THAN ISC-TEMP GO TO CHECK-I-4. C98970
70320 IF SERIAL-NO IS EQUAL TO ISC-TEMP GO TO CHECK-I-1A. C98970
70330 IF CNT IS LESS THAN NO-ISC-AC GO TO CHECK-I-1. C98970
70340 CHECK-I-4. C98970
70350 MOVE TWO TO ISC-FLAG. C98970
70360 GO TO CHECK-I-3. C98970
70370 CHECK-I-1A. C98970
70380 MOVE ISC-AC-WK (CNT) TO WEEK-TEMP. C98970
70390 IF WEEK-TEMP IS EQUAL TO WEEK OR WEEK IS GREATER THAN C98970
70400 WEEK-TEMP MOVE ONE TO ISCHRONAL. C98970
70410 MOVE ONE TO ISC-FLAG. C98970
70430 CHECK-I-3. C98970
70440 MOVE SERIAL-NO TO PREV-TESTED-SN. C98970
70450 ENU-CI. EXIT. C98970
70510 NINE-FILL-2. C98970
70520 WRITE OUT-REC-2 FROM NINE. C98970
70530 ADD 1 TO KNT. C98970
70540 IF KNT IS LESS THAN 90 GO TO NINE-FILL-2. C98970
70550 N-F-2. EXIT. C98970
70600 NINE-FILL-1. C98970
70610 WRITE OUT-REC-1 FROM NINE. C98970
70620 ADD 1 TO KNT. C98970
70630 IF KNT IS LESS THAN 90 GO TO NINE-FILL-1. C98970
70640 N-F-1. EXIT. C98970
71800 CLOSE-FILES. C98970
71810 COMPUTE KNT > NO-REC-1 - NO-REC-1 / 90 * 90. C98970
71820 IF KNT IS ZERO GO TO CF-2. C98970
71830 PERFORM NINE-FILL-1 THRU N-F-1. C98970
71840 CF-2. C98970
71850 COMPUTE KNT > NO-REC-2 - NO-REC-2 / 90 * 90. C98970
71860 IF KNT IS ZERO GO TO CF-3. C98970
71870 PERFORM NINE-FILL-2 THRU N-F-2. C98970
71900 CF-3. C98970
71910 DISPLAY : NUMBER RECORDS-1 : NO-REC-1 UPON CONSOLE. C98970
71920 DISPLAY : NUMBER RECORDS-2 : NO-REC-2 UPON CONSOLE. C98970
71940 DISPLAY : END OF JOB C9897: UPON CONSOLE. C98970
71950 CLOSE IN-FILE-D-B, MSG-FILE, OUT-FILE-1, C98970
71960 OUT-FILE-2 WITH LOCK. C98970
71990 GOBACK. C98970
/* PLACE COBOL SOURCE BEFORE THIS CARD
//CHG,TF6IN DD *.SPACE>(CYL,(1,1))
00000 GET TFG WANG
010001 019999 REPLACE
TF6 DT01 11 0202080
0330003310033200333003400036000310003200032100204
34
57000236 331
57000237 331
57000243 324
57000244 331
57002545 331
58000776 324
58000901 331
59000002 331
59000003 331
59000005 331
59000006 331
59000010 331
59000012 331
59000015 331
59000018 331
59000019 331
59000026 331
59000030 331
59000054 324
59000057 324
59000058 324
59000059 324
59000104 331
59000105 331
59000108 324
59000110 324
59000119 324
59000141 324
59000143 324
59000144 324
59000145 324
59000147 324
59000151 324
59000152 324
*END

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1440 CDS
C98970'T
IT

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/* PLACE TFG DATA BEFORE THIS CARD
//TPR,TU14 DU DISP>[OLD,KEEP],VOL>SER>+F3,UNIT>T+F3 T14
//TPR,TU22 DU DISP>[OLD,KEEP],VOL>SER>+F5,UNIT>T+F5 T22
//TPR,TU24 DU DISP>[OLD,KEEP],VOL>SER>+F7,UNIT>T+F7 T24
//TPR,TPRIN DU *,SPACE>[THK,[1,1]]
T/P DT01 10100002080
T/P DT02 10100002080
T/P TU14 10100702070
T/P TU22 10100202020
T/P TU24 10100202020
/* PLACE T/P CONTROL CARDS BEFORE THIS CARD

//T9897W JOB 01: G WANG : ,PRTY>02,TPRUN>HOLD
//C9897F EXEC P9622N,*,>060,TIME>04,ACCT>D35323007
//CHG, SORTIN DU DISP>[KEEP],UNIT>[A+F5,2,DEFER], CT22/23 1
// PS>+E,9897432, CT22 2
// VOL>SER>[+F5,A+F5,H+F5,C+F5,D+F5,E+F5,F+F5,G+F5,H+F5, CT22 3
// I+F5,J+F5,K+F5,L+F5,M+F5,N+F5,O+F5,P+F5,Q+F5,R+F5,S+F5], CT22 4
// DCB>[LRECL>0020,HLKSIZE>1800],LABEL>[ ,NSL,RETPD>099]
//CHG, SORTOUT DU DISP>[KEEP],UNIT>[A+F1,2,DEFER],DSN>+A,9897430, CT12/13 1
// VOL>SER>[+F1,A+F1,B+F1,C+F1,D+F1,E+F1,F+F1,G+F1,H+F1, CT12 2
// I+F1,J+F1,K+F1,L+F1,M+F1,N+F1,O+F1,P+F1,Q+F1,R+F1,S+F1], CT12 3
// DCB>[LRECL>0020,HLKSIZE>1800]
//CHG, SYSIN DU *,DCB>[LRECL>0020,SPACE>[THK,[1,1]]
SORT FIELDS>[01,001,CH,A,019,001,CH,A,001,005,CH,A],SIZE>E0350000
MODS E15>[E15,000,SOFTLIB,N],E18>[E18,024,SOFTLIB,N]
/*
//C9897C EXEC P9635L,TIME>30,ACCT>D35323007
//CHG,TU12 DU DISP>[PASS],UNIT>[T+F1,1,DEFER],DSN>+A,9897430, CT12 1
// VOL>SER>[+F1,A+F1,B+F1,C+F1,D+F1,E+F1,F+F1,G+F1,H+F1, CT12 2
// I+F1,J+F1,K+F1,L+F1,M+F1,N+F1,O+F1,P+F1,Q+F1,R+F1,S+F1] T12 3
//CHG,TU25 DU DISP>[PASS],UNIT>[T+F8,1,DEFER],DSN>+H,9897431, CT25 1
// VOL>SER>[+F8,A+F8,H+F8,C+F8,D+F8,E+F8,F+F8,G+F8,H+F8, CT25 2
// I+F8,J+F8,K+F8,L+F8,M+F8,N+F8,O+F8,P+F8,Q+F8,R+F8,S+F8] T25 3
//CHG, INPUT DU *,SPACE>[CYL,[1,1]]
00000 COMLINE COMPLETE G. WANG. 1440 CDS
01040 DATE-WRITTEN. 25 JULY 72. C98970
01050 REMARKS. C98970
01060 TASK 7-2B MEAN, VARIANCE OF NORM/MA. C98970
02000 ENVIRONMENT DIVISION. C98970
02010 CONFIGURATION SECTION. C98970
02020 SOURCE-COMPUTER. IBM-360. C98970
02030 OBJECT-COMPUTER. IBM-360. C98970
02100 INPUT-OUTPUT SECTION. C98970
02110 FILE-CONTROL. C98970
02120 SELECT IN-FILE ASSIGN TO UT-S-TU12 C98970
02130 RESERVE 1 ALTERNATE AREA. C98970
02140 SELECT HIST-FILE ASSIGN TO UT-S-TU25 C98970
02150 RESERVE 1 ALTERNATE AREA. C98970
10000 DATA DIVISION. C98970
10010 FILE SECTION. C98970
11000 FD IN-FILE C98970
11120 RECORDING MODE IS F C98970
11130 BLOCK CONTAINS 90 RECORDS C98970
11140 RECORD CONTAINS 20 CHARACTERS C98970
11150 LABEL RECORDS ARE OMITTED C98970
11160 DATA RECORDS ARE IN-REC. C98970
11170 01 IN-REC SYNC. C98970
11180 02 WUC PICTURE X(5). C98970
11182 02 FILLER PICTURE X(4). C98970
11183 02 OBS PICTURE S9(6). C98970
11184 02 OBS-1 REDEFINES OBS PICTURE S99999V9. C98970
11185 02 FILLER PICTURE X. C98970
11186 02 ISCHRONAL-NEW PICTURE X. C98970
11187 02 FILLER PICTURE X. C98970
11188 02 DATA-TYPE-NEW PICTURE X. C98970
11189 02 FILLER PICTURE X. C98970
12100 FD HIST-FILE C98970
12120 RECORDING MODE IS F C98970
12130 BLOCK CONTAINS 60 RECORDS C98970
12140 RECORD CONTAINS 50 CHARACTERS C98970
12150 LABEL RECORDS ARE OMITTED C98970
12160 DATA RECORDS ARE HIST-REC. C98970
12170 01 HIST-REC SYNC. C98970
12180 02 FILLER PICTURE X(50). C98970
30000 WORKING-STORAGE SECTION. C98970
30010 77 KNT SYNC PICTURE S9(5). C98970
30012 77 OBS-ISO SYNC PICTURE S9(5)V99999. C98970
30014 77 OBS-NI SYNC PICTURE S9(5)V99999. C98970
30020 01 FILLER SYNC. C98970
30030 02 FREQ-HIST-VALUE OCCURS 2000 TIMES PICTURE S9(5) C98970
30040 COMPUTATIONAL. C98970
30050 01 A PICTURE S9(5) COMPUTATIONAL. C98970
30060 01 NO-OF-HISTS SYNC PICTURE 99999 VALUE ZERO. C98970
30080 01 ONE SYNC PICTURE X VALUE :1:. C98970
30081 01 TWO SYNC PICTURE X VALUE :2:. C98970
30082 01 THREE SYNC PICTURE X VALUE :3:. C98970

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30083	01	FOUR	SYNC	PICTURE X	VALUE :4:.	C98970
30084	01	FIVE	SYNC	PICTURE X	VALUE :5:.	C98970
30090	01	CNT SYNC			PICTURE S9C5J COMPUTATIONAL.	C98970
30100	01	CUR-WUC-T SYNC.				C98970
30110		02 FILLER		PICTURE X(5J	VALUE : WUC>:.	C98970
30120		02 CUK-WUC		PICTURE X(5J.		C98970
30170	01	ISCHRONAL SYNC		PICTURE X.		C98970
30180	01	DATA-TYPE SYNC		PICTURE X.		C98970
30190	01	MINUS-ONE COMPUTATIONAL		PICTURE S999	VALUE -1 SYNC.	C98970
32000	01	REPORT-ID SYNC.				C98970
32010		02 FILLER		PICTURE X(50J	VALUE	C98970
32020		:9897860	TF7919-01	142-8 1	1/2	C98970
32030		02 FILLER		PICTURE X(50J	VALUE SPACE.	C98970
32040		02 FILLER		PICTURE X(30J	VALUE	C98970
32050		:		:		C98970
46000	01	MEAN	COMPUTATIONAL SYNC	PICTURE S9C7JV99.		C98970
46010	01	VARIANCE	COMPUTATIONAL SYNC	PICTURE S9C7JV99.		C98970
46020	01	TEMP-COMP		PICTURE S9C7JV99.		C98970
46300	01	MEAN-U	COMPUTATIONAL SYNC	PICTURE S9C5JV99999	VALUE ZERO.	C98970
46310	01	VARIANCE-B	COMPUTATIONAL SYNC	PICTURE S9C5JV99999		C98970
46315		VALUE ZERO.				C98970
46320	01	TEMP-COMP-B		SYNC PICTURE S9C5JV99999		C98970
46325		VALUE ZERO.				C98970
46330	01	HIST-NO-OF-OHS-U		SYNC PICTURE S9C5JV99999		C98970
46335		VALUE ZERO.				C98970
46400	01	MEAN-VARIANCE-LINE-B	SYNC.			C98970
46410		02 FILLER		PICTURE X(50J	VALUE	C98970
46420		:S				C98970
46430		02 FILLER		PICTURE X(16J	VALUE	C98970
46440		:		MEAN>:.		C98970
46450		02 MEAN-HPT-B		PICTURE Z29.99999.		C98970
46460		02 FILLER		PICTURE X(28J	VALUE	C98970
46470		:		VARIANCE >:.		C98970
46480		02 VARIANCE-RPT-R		PICTURE Z2229.99999.		C98970
46490		02 FILLER		PICTURE X(16J	VALUE	C98970
46500		:		:		C98970
47000	01	HIST-VALUE-MAX SYNC		PICTURE S9999V99	VALUE -9999.9.	C98970
47010	01	HIST-VALUE-MIN SYNC		PICTURE S9999V99	VALUE <9999.9.	C98970
47015	01	HIST-VALUE-MI SYNC		PICTURE S9999V99	VALUE <9999.9.	C98970
47020	01	HIST-NO-OF-ORS SYNC		PICTURE S9C5J	VALUE ZERO.	C98970
47030	01	HIST-NO-OF-INTERVALS SYNC		PICTURE 999V99	VALUE 50.	C98970
47040	01	HIST-INPUT-VMAX-VMIN SYNC		PICTURE 9	VALUE ZERO.	C98970
47050	01	HIST-DIST SYNC		PICTURE X	VALUE :1:.	C98970
47060	01	HIST-INDEX SYNC COMPUTATIONAL				C98970
47070				PICTURE S999	VALUE ZERO.	C98970
47080	01	HIST-INDEX-2 SYNC COMPUTATIONAL				C98970
47090				PICTURE S999	VALUE ZERO.	C98970
47100	01	HIST-TEMP SYNC		PICTURE S9999V99	VALUE ZERO.	C98970
47110	01	HIST-INTERVAL-SIZE SYNC		PICTURE S999V99	VALUE ZERO	C98970
47120		COMPUTATIONAL.				C98970
47150	01	HIST-FLAG SYNC		PICTURE X	VALUE :0:.	C98970
47160	01	HIST-SCALE-VALUE SYNC COMPUTATIONAL				C98970
47170				PICTURE S999	VALUE <1.	C98970
47180	01	HIST-PERCENT SYNC		PICTURE S999V99	COMPUTATIONAL.	C98970
47190	01	HIST-CUM SYNC		PICTURE S999V99	COMPUTATIONAL.	C98970
47200	01	HIST-LINE SYNC COMPUTATIONAL				C98970
47210				PICTURE S999	VALUE ZERO.	C98970
47220	01	HIST-PAGE-FLAG SYNC		PICTURE S999	VALUE <75.	C98970
47230	01	HIST-LINE-CNT SYNC		PICTURE S999.		C98970
47300	01	HIST-ERR-1 SYNC		PICTURE X(10J	VALUE	C98970
47310		:ERROK NO 0:.				C98970
47320	01	HIST-ERR-3 SYNC.				C98970
47330		02 FILLER		PICTURE X(5J	VALUE :BS >:.	C98970
47340		02 HIST-ERR-2		PICTURE S9C5J	VALUE ZERO.	C98970
47350	01	HIST-ERR-4 SYNC		PICTURE X(10J	VALUE	C98970
47360		:ERROK MAX:.				C98970
47370	01	HIST-ERR-5 SYNC		PICTURE X(10J	VALUE	C98970
47380		:MIN BAD. :.				C98970
47390	01	HIST-OUT-RANGE-VALUE SYNC		PICTURE S999	COMPUTATIONAL.	C98970
47500	01	FILLER SYNC.				C98970
47510		02 FILLER OCCURS 200 TIMES.				C98970
47530		03 HIST-TABLE		PICTURE S9C5J	COMPUTATIONAL.	C98970
47540		03 HIST-UPPER-LIMIT		PICTURE S9999V99	COMPUTATIONAL.	C98970
47550		03 HIST-TABLE-SCALED		PICTURE S999V99	COMPUTATIONAL.	C98970
47560	01	HIST-NEW-PAGE SYNC.				C98970
47570		02 FILLER		PICTURE X	VALUE :1:.	C98970
47580		02 FILLER		PICTURE X(12J	VALUE SPACE.	C98970
47582		02 FILLER		PICTURE X(5J	VALUE :PAGE :.	C98970
47584		02 HIST-PAGE-NO		PICTURE 9.		C98970
47590		02 FILLER		PICTURE X	VALUE :2:.	C98970
47600	01	HIST-TITLE SYNC.				C98970
47610		02 FILLER		PICTURE X(3J	VALUE :S :.	C98970
47620		02 HIST-TITLE-1.				C98970
47621		03 FILLER		PICTURE X(10J	VALUE SPACE.	C98970
47630		02 HIST-TITLE-2.				C98970
47631		03 FILLER		PICTURE X(10J	VALUE SPACE.	C98970
47640		02 HIST-TITLE-3		PICTURE X(10J	VALUE SPACE.	C98970

47650	02	HIST-TITLE-4	PICTURE X(10) VALUE SPACE.	C98970
47660	02	FILLER	PICTURE X(24) VALUE	C98970
47670	:	NO OF OBSERVATIONS >:.		C98970
47680	02	HIST-NO-OF-OBS-RPT	PICTURE ZZZZ9.	C98970
47690	02	FILLER	PICTURE X(13) VALUE	C98970
47700	:	VALUE MAX >:.		C98970
47710	02	HIST-VALUE-MAX-RPT	PICTURE -----,9.	C98970
47720	02	FILLER	PICTURE X(13) VALUE	C98970
47730	:	VALUE MIN >:.		C98970
47740	02	HIST-VALUE-MIN-RPT	PICTURE -----,9.	C98970
47750	02	FILLER	PICTURE X(10) VALUE	C98970
47760	:		?:.	C98970
47900	01	HIST-DOI-LINE SYNC.		C98970
47910	02	FILLER	PICTURE X(50) VALUE	C98970
47920	:	-----:.		C98970
47922	02	FILLER	PICTURE X(80) VALUE	C98970
47930	:	-----:.		C98970
47940	-	-----?:.		C98970
47950	01	HIST-LABEL SYNC.		C98970
47960	02	FILLER	PICTURE X(50) VALUE	C98970
47970	:	MIDPNT PCNT CUM FREQ 1...5...10...15...20...:		C98970
47974	02	FILLER	PICTURE X(80) VALUE	C98970
47980	-	:25...30...35...40...45...50...55...60...65...70...75...80...		C98970
47990	-	:85...90...95...100?:.		C98970
48000	01	HIST-LINE-OUT SYNC.		C98970
48010	02	FILLER	PICTURE X VALUE :?:.	C98970
48020	02	HIST-LINE-RPT	PICTURE ZZ9.	C98970
48030	02	FILLER	PICTURE X VALUE SPACE.	C98970
48040	02	HIST-MID-POINT-RPT	PICTURE -----,9.	C98970
48060	02	HIST-PERCENT-RPT	PICTURE ZZ9,9.	C98970
48070	02	FILLER	PICTURE X VALUE SPACE.	C98970
48080	02	HIST-CUM-RPT	PICTURE ZZ9,9.	C98970
48100	02	HIST-FREQ-RPT	PICTURE ZZZZ9.	C98970
48110	02	FILLER	PICTURE X VALUE SPACE.	C98970
48120	02	HIST-POINT OCCURS 100 TIMES		C98970
48130			PICTURE X.	C98970
48140	02	FILLER	PICTURE X VALUE :?:.	C98970
48150	01	HIST-OUT-RANGE-REC SYNC.		C98970
48160	02	FILLER	PICTURE X(35) VALUE	C98970
48170	:	NUMBER OF OUT OF RANGE VALUES >:.		C98970
48180	02	HIST-OUT-RANGE-RPT	PICTURE ZZ9.	C98970
48190	02	FILLER	PICTURE X(41) VALUE SPACE.	C98970
48191	02	FILLER	PICTURE X VALUE :?:.	C98970
48200	01	HIST-SCALE-LINE SYNC.		C98970
48210	02	FILLER	PICTURE X(27) VALUE	C98970
48220	:	SCALING FACTOR >:.		C98970
48230	02	HIST-SCALE-RPT	PICTURE ZZ9.	C98970
48240	02	FILLER	PICTURE X(099) VALUE SPACE.	C98970
48250	02	FILLER	PICTURE X VALUE :?:.	C98970
48300	01	FILLER SYNC.		C98970
48310	02	HIST-VALUE OCCURS 2000 TIMES		C98970
48320			PICTURE S9999V9 COMPUTATIONAL.	C98970
48400	01	TASK7-REC SYNC.		C98970
48410	05	TASK7-ISO	PICTURE X.	C98970
48411	05	FILLER	PICTURE X(9).	C98970
48420	05	TASK7-ID	PICTURE X(1) VALUE :?:.	C98970
48430	05	FILLER	PICTURE X(1).	C98970
48440	05	TASK7-WUC	PICTURE X(5).	C98970
48450	05	FILLER	PICTURE X(5).	C98970
48460	05	MEAN-RPT	PICTURE S9(7)V9.	C98970
48470	05	FILLER	PICTURE X.	C98970
48480	05	VARIANCE-RPT	PICTURE S9(7)V9.	C98970
48490	05	FILLER	PICTURE X(10).	C98970
48500	05	FILLER	PICTURE X VALUE :?:.	C98970
50000		PROCEDURE DIVISION.		C98970
50010		OPEN INPUT IN-FILE.		C98970
50020		OPEN OUTPUT HIST-FILE.		C98970
50030		MOVE 2000 TO KNI.		C98970
50040		PERFORM RESET-TABLE THRU END-RST-TABLE.		C98970
50050		READ IN-FILE, AT END GO TO CLOSE-FILES.		C98970
50100		PARA-1.		C98970
50110		MOVE 1 TO HIST-NO-OF-OBS.		C98970
50120		MOVE WUC TO CUR-WUC.		C98970
50140		MOVE DATA-TYPE-NEW TO DATA-TYPE.		C98970
50150		MOVE ISCHRONAL-NEW TO ISCHRONAL.		C98970
50160		IF DATA-TYPE IS EQUAL TO FIVE GO TO WEEKS-DATA ELSE GO TO		C98970
50170		FLT-DATA.		C98970
50200		READ1.		C98970
50210		READ IN-FILE, AT END GO TO CLOSE-FILES.		C98970
50220		IF DATA-TYPE-NEW IS EQUAL TO :9: GO TO CLOSE-FILES.		C98970
50230		IF WUC IS NOT EQUAL TO CUR-WUC GO TO PARA-2.		C98970
50250		ADD 1 TO HIST-NO-OF-OBS.		C98970
50260		IF DATA-TYPE IS EQUAL TO FIVE GO TO WEEKS-DATA ELSE GO TO		C98970
50270		FLT-DATA.		C98970
50300		PARA-2.		C98970
50310		PERFORM SET-HISTOG THRU END-SH.		C98970
50320		PERFORM RESET-TABLE THRU END-RST-TABLE.		C98970
50330		GO TO PARA-1.		C98970

50400	RESET-TABLE.	C98970
50410	MOVE ZERO TO CNT.	C98970
50420	RST.	C98970
50430	ADD 1 TO CNT.	C98970
50440	MOVE MINUS-ONE TO HIST-VALUE [CNT].	C98970
50445	MOVE ZERO TO FREQ-HIST-VALUE [CNT].	C98970
50450	IF CNT IS LESS THAN KNT GO TO RST.	C98970
50455	MOVE ZERO TO KNT.	C98970
50460	END-HIST-TABLE. EXIT.	C98970
50510	SET-HISTOG.	C98970
50590	PERFORM WRITE-HISTOGRAM THRU END-HIST.	C98970
50600	IF HIST-FLAG IS EQUAL TO :1: THEN GO TO CF1.	C98970
50610	ADD 1 TO NO-OF-HISTS.	C98970
50620	END-SH. EXIT.	C98970
51000	WEEKS-DATA.	C98970
51010	MOVE ZERO TO CNT.	C98970
51020	WEEK-A.	C98970
51030	ADD 1 TO CNT.	C98970
51040	IF OBS IS EQUAL TO HIST-VALUE [CNT] GO TO WEEK-C.	C98970
51050	IF FREQ-HIST-VALUE [CNT] IS EQUAL TO ZERO GO TO WEEK-B.	C98970
51060	IF CNT IS LESS THAN 2000 GO TO WEEK-A.	C98970
51070	DISPLAY : MORE THAN 2000 FREQUENCY OCCURENCES : UPON CONSOLE.	C98970
51080	GO TO CF1.	C98970
51090	WEEK-B.	C98970
51100	MOVE OBS TO HIST-VALUE [CNT].	C98970
51110	IF CNT IS GREATER THAN KNT THEN MOVE CNT TO KNT.	C98970
51120	WEEK-C.	C98970
51130	ADD 1 TO FREQ-HIST-VALUE [CNT].	C98970
51140	GO TO HEAD1.	C98970
52000	FLT-DATA.	C98970
52010	MOVE ZERO TO CNT.	C98970
52020	FLT-A.	C98970
52030	ADD 1 TO CNT.	C98970
52040	IF OBS-1 IS EQUAL TO HIST-VALUE [CNT] GO TO FLT-C.	C98970
52050	IF FREQ-HIST-VALUE [CNT] IS EQUAL TO ZERO GO TO FLT-B.	C98970
52060	IF CNT IS LESS THAN 2000 GO TO FLT-A.	C98970
52070	DISPLAY : MORE THAN 2000 FREQUENCY OCCURENCES : UPON CONSOLE.	C98970
52080	GO TO CF1.	C98970
52090	FLT-B.	C98970
52100	MOVE OBS-1 TO HIST-VALUE [CNT].	C98970
52110	IF CNT IS GREATER THAN KNT THEN MOVE CNT TO KNT.	C98970
52120	FLT-C.	C98970
52130	ADD 1 TO FREQ-HIST-VALUE [CNT].	C98970
52140	GO TO HEAD1.	C98970
52200	CLOSE-FILES.	C98970
52205	PERFORM SET-HISTOG THRU END-SH.	C98970
52207	CF1.	C98970
52210	CLOSE IN-FILE, HIST-FILE.	C98970
52211	IF HIST-FLAG IS EQUAL TO :1: DISPLAY : HIST ERROR : UPON	C98970
52212	CONSOLE.	C98970
52215	DISPLAY : NO OF HISTOGRAMS > : NO-OF-HISTS UPON CONSOLE.	C98970
52220	DISPLAY : E0J C9897 : UPON CONSOLE.	C98970
52230	GOPACK.	C98970
95000	COMPUTE-MEAN-VARIANCE.	C98970
95005	IF HIST-NO-OF-OBS EQUAL TO 1 GO TO CMV-3.	C98970
95010	MOVE ZERO TO CNT.	C98970
95020	MOVE ZERO TO MEAN.	C98970
95030	CMV-1.	C98970
95040	ADD 1 TO CNT.	C98970
95050	COMPUTE TEMP-COMP > HIST-VALUE [CNT] * FREQ-HIST-VALUE [CNT].	C98970
95060	ADD TEMP-COMP TO MEAN.	C98970
95070	IF CNT IS LESS THAN KNT GO TO CMV-1.	C98970
95080	DIVIDE HIST-NO-OF-OBS INTO MEAN.	C98970
95090	MOVE ZERO TO CNT.	C98970
95100	MOVE ZERO TO VARIANCE.	C98970
95110	CMV-2.	C98970
95120	ADD 1 TO CNT.	C98970
95130	COMPUTE TEMP-COMP > [(HIST-VALUE [CNT] - MEAN) ** 2] * FREQ-HIST-VALUE [CNT].	C98970
95140	ADD TEMP-COMP TO VARIANCE.	C98970
95150	IF CNT IS LESS THAN KNT GO TO CMV-2.	C98970
95170	COMPUTE VARIANCE > VARIANCE / [HIST-NO-OF-OBS - 1].	C98970
95180	MOVE MEAN TO MEAN-RPT.	C98970
95190	MOVE VARIANCE TO VARIANCE-RPT.	C98970
95191	GO TO CMV-4.	C98970
95192	CMV-3.	C98970
95193	MOVE ZERO TO VARIANCE-RPT.	C98970
95194	MOVE HIST-VALUE [1] TO MEAN-RPT.	C98970
95195	CMV-4.	C98970
95200	END-CMV. EXIT.	C98970
97000	WRITE-HISTOGRAM.	C98970
97351	PERFORM COMPUTE-MEAN-VARIANCE	C98970
97352	THRU END-CMV.	C98970
97356	MOVE CUR-WUC TO TASK7-WUC.	C98970
97358	MOVE ISCHRONAL TO TASK7-ISO.	C98970
97360	WRITE HIST-REC FROM TASK7-REC.	C98970
99990	END-HIST. EXIT.	C98970

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/* PLACE CONTROL SOURCE BEFORE
//CHG.TFGIN DU *.SPACE>[CYL,[1,1]] 1440 CDS
/* PLACE TFG DATA BEFORE THIS CARD
//TPR,TU12 DU DISP>[OLD,KEEP],VOL>SER>+F1,UNIT>T+F1 T12
//TPR,TU25 DU DISP>[OLD,KEEP],VOL>SER>+F8,UNIT>T+F8 T25
//TPR,TPRIN DU *.SPACE>[TRK,[1,1]]
T/P TU12 101002020
T/P TU25 10100502050
/* PLACE T/P CONTROL CARDS BEFORE THIS CARD

//T9897N JOB 01.: G WANG : ,PRTY>02,TPRUN>HOLD
//C9897F EXEC P962N,W>06U,TIME>04,ACCT>D35323007
//CHG.SORTIN DU DISP>[KEEP],UNIT>[A+F5,2,DEFER], CT22/23 1
// VOL>SER>[F5,A+F5,B+F5,C+F5,D+F5,E+F5,F+F5,G+F5,H+F5, CT22 2
// I+F5,J+F5,K+F5,L+F5,M+F5,N+F5,O+F5,P+F5,Q+F5,R+F5,S+F5],CT22 3
// DCB>[LRECL>0020,BLKSIZE>1800],LABEL>[NSL,RETPD>099]
//CHG.SORTOUT DU DISP>[KEEP],UNIT>[A+F1,2,DEFER],DSN>+A.9897430, CT12/13 1
// VOL>SER>[F1,A+F1,B+F1,C+F1,D+F1,E+F1,F+F1,G+F1,H+F1, CT12 2
// I+F1,J+F1,K+F1,L+F1,M+F1,N+F1,O+F1,P+F1,Q+F1,R+F1,S+F1],CT12 3
// DCB>[LRECL>0020,BLKSIZE>1800]
//CHG.SYSIN DU *.UCB>BLKSIZE>0000,SPACE>[TRK,[1,1]]
SORT FIELDS>[017,001,CH,A,019,001,CH,A,001,005,CH,A,006,003,CH,A], C
SIZE>E0250000
MODS E15>[E15,008,SORTLIB,N],E18>[E18,024,SORTLIB,N]

/*
//C9897N EXEC P9655L,TIME>16,ACCT>D35323007
//CHG.TU12 DU DISP>[PASS],UNIT>[T+F1,1,DEFER],DSN>+A.9897430, CT12 1
// VOL>SER>[F1,A+F1,B+F1,C+F1,D+F1,E+F1,F+F1,G+F1,H+F1, CT12 2
// I+F1,J+F1,K+F1,L+F1,M+F1,N+F1,O+F1,P+F1,Q+F1,R+F1,S+F1] T12
//CHG.TU25 DU DISP>[PASS],UNIT>[T+F8,1,DEFER],DSN>+H.9897431, CT25 1
// VOL>SER>[F8,A+F8,B+F8,C+F8,D+F8,E+F8,F+F8,G+F8,H+F8, CT25 2
// I+F8,J+F8,K+F8,L+F8,M+F8,N+F8,O+F8,P+F8,Q+F8,R+F8,S+F8] T25 3
//CHG.INPUT DU *.SPACE>[CYL,[1,1]] 1440 CDS
00000 COMBINE - COMPILE G. WANG. C98970
01040 DATE-WRITTEN. 26 JULY 72. C98970
01050 REMARKS. C98970
01060 TASK 7-2C MEAN VARIANCE OF MANHOURS/MA. C98970
02000 ENVIRONMENT DIVISION. C98970
02010 CONFIGURATION SECTION. C98970
02020 SOURCE-COMPUTER. IBM-360. C98970
02030 OBJECT-COMPUTER. IBM-360. C98970
02100 INPUT-OUTPUT SECTION. C98970
02110 FILE-CONTROL. C98970
02120 SELECT IN-FILE ASSIGN TO UT-S-TU12 C98970
02130 RESERVE 1 ALTERNATE AREA. C98970
02140 SELECT HIST-FILE ASSIGN TO UT-S-TU25 C98970
02150 RESERVE 1 ALTERNATE AREA. C98970
10000 DATA DIVISION. C98970
10010 FILE SECTION. C98970
11100 FD IN-FILE C98970
11120 RECORDING MODE IS F C98970
11130 BLOCK CONTAINS 90 RECORDS C98970
11140 RECORD CONTAINS 20 CHARACTERS C98970
11150 LABEL RECORDS ARE OMITTED C98970
11160 DATA RECORDS ARE IN-REC. C98970
11170 01 IN-REC SYNC. C98970
11180 02 WUC PICTURE X(5). C98970
11181 02 HMC PICTURE X(3). C98970
11182 02 FILLER PICTURE X. C98970
11183 02 OBS PICTURE S9(6). C98970
11184 02 OBS-1 REDEFINES OBS PICTURE S99999V9. C98970
11185 02 FILLER PICTURE X. C98970
11186 02 ISCHRONAL-NEW PICTURE X. C98970
11187 02 FILLER PICTURE X. C98970
11188 02 DATA-TYPE-NEW PICTURE X. C98970
11189 02 FILLER PICTURE X. C98970
12100 FD HIST-FILE C98970
12120 RECORDING MODE IS F C98970
12130 BLOCK CONTAINS 60 RECORDS C98970
12140 RECORD CONTAINS 50 CHARACTERS C98970
12150 LABEL RECORDS ARE OMITTED C98970
12160 DATA RECORDS ARE HIST-REC. C98970
12170 01 HIST-REC SYNC. C98970
12180 02 FILLER PICTURE X(50). C98970
30000 WORKING-STORAGE SECTION. C98970
30010 77 KNT SYNC PICTURE S9(5). C98970
30020 01 FILLER SYNC. C98970
30030 02 FREQ-HIST-VALUE OCCURS 1000 TIMES PICTURE S9(5) C98970
30040 COMPUTATIONAL. C98970
30050 01 A PICTURE S9(5) COMPUTATIONAL. C98970
30060 01 NO-OF-HISTS SYNC PICTURE 9999 VALUE ZERO. C98970
30080 01 ONE SYNC PICTURE X VALUE !1. C98970
30082 01 TWO SYNC PICTURE X VALUE !2. C98970
30090 01 CNT SYNC PICTURE S9(5) COMPUTATIONAL. C98970
30100 01 CUR-WUC-T SYNC. C98970
30110 02 FILLER PICTURE X(5) VALUE : WUC>!. C98970

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30120	02	CUR-WUC	PICTURE X[5],	C98970
30130	01	CUR-HMC-T SYNC.		C98970
30140	02	FILLER	PICTURE X[5] VALUE : HMC>:.	C98970
30150	02	CUR-HMC	PICTURE X[3],	C98970
30160	02	FILLER	PICTURE XX VALUE SPACE.	C98970
30170	01	ISCHRONAL SYNC	PICTURE X.	C98970
30180	01	DATA-TYPE SYNC	PICTURE X.	C98970
30190	01	MINUS-ONE COMPUTATIONAL	PICTURE S999 VALUE -1 SYNC.	C98970
32000	01	REPORT-ID SYNC.		C98970
32010	02	FILLER	PICTURE X[50] VALUE	C98970
32020		:\$9897B60 TF7919-01 142-8 1 1/2	;	C98970
32030	02	FILLER	PICTURE X[50] VALUE SPACE.	C98970
32040	02	FILLER	PICTURE X[30] VALUE	C98970
32050		:	;	C98970
46000	01	MEAN COMPUTATIONAL SYNC	PICTURE S9[7]V99.	C98970
46010	01	VARIANCE COMPUTATIONAL SYNC	PICTURE S9[7]V99.	C98970
46020	01	TEMP-COMP	PICTURE S9[7]V99.	C98970
47000	01	HIST-VALUE-MAX SYNC	PICTURE S9999V99 VALUE -9999.9.	C98970
47010	01	HIST-VALUE-MIN SYNC	PICTURE S9999V99 VALUE <9999.9.	C98970
47015	01	HIST-VALUE-MI SYNC	PICTURE S9999V99 VALUE <9999.9.	C98970
47020	01	HIST-NO-OF-OBS SYNC	PICTURE S9[5] VALUE ZERO.	C98970
47030	01	HIST-NO-OF-INTERVALS SYNC	PICTURE S999V99 VALUE 50.	C98970
47040	01	HIST-INPUT-VMAX-VMIN SYNC	PICTURE 9 VALUE ZERO.	C98970
47050	01	HIST-DIST SYNC	PICTURE X VALUE :1:.	C98970
47060	01	HIST-INDEX SYNC COMPUTATIONAL		C98970
47070			PICTURE S999 VALUE ZERO.	C98970
47080	01	HIST-INDEX-2 SYNC COMPUTATIONAL		C98970
47090			PICTURE S999 VALUE ZERO.	C98970
47100	01	HIST-TEMP SYNC	PICTURE S9999V99 VALUE ZERO.	C98970
47110	01	HIST-INTERVAL-SIZE SYNC	PICTURE S999V99 VALUE ZERO	C98970
47120		COMPUTATIONAL.		C98970
47150	01	HIST-FLAG SYNC	PICTURE X VALUE :0:.	C98970
47160	01	HIST-SCALE-VALUE SYNC COMPUTATIONAL		C98970
47170			PICTURE S999 VALUE <1.	C98970
47180	01	HIST-PERCENT SYNC	PICTURE S999V99 COMPUTATIONAL.	C98970
47190	01	HIST-CUR SYNC	PICTURE S999V99 COMPUTATIONAL.	C98970
47200	01	HIST-LINE SYNC COMPUTATIONAL		C98970
47210			PICTURE S999 VALUE ZERO.	C98970
47220	01	HIST-PAGE-FLAG SYNC	PICTURE S999 VALUE <75.	C98970
47230	01	HIST-LINE-CNT SYNC	PICTURE S999.	C98970
47300	01	HIST-ERR-1 SYNC	PICTURE X[10] VALUE	C98970
47310		ERROR NO 0:.		C98970
47320	01	HIST-ERR-3 SYNC.		C98970
47330	02	FILLER	PICTURE X[5] VALUE :BS > :.	C98970
47340	02	HIST-ERR-2	PICTURE S9[5] VALUE ZERO.	C98970
47350	01	HIST-ERR-4 SYNC	PICTURE X[10] VALUE	C98970
47360		ERROR MAX:.		C98970
47370	01	HIST-ERR-5 SYNC	PICTURE X[10] VALUE	C98970
47380		:-MIN BAD. ;.		C98970
47390	01	HIST-OUT-RANGE-VALUE SYNC	PICTURE S999 COMPUTATIONAL.	C98970
47500	01	FILLER SYNC.		C98970
47510	02	FILLER OCCURS 200 TIMES.		C98970
47530	03	HIST-TABLE	PICTURE S9[5] COMPUTATIONAL.	C98970
47540	03	HIST-UPPER-LIMIT	PICTURE S9999V99 COMPUTATIONAL.	C98970
47550	03	HIST-TABLE-SCALED	PICTURE S999V99 COMPUTATIONAL.	C98970
47560	01	HIST-NEW-PAGE SYNC.		C98970
47570	02	FILLER	PICTURE X VALUE :1:.	C98970
47580	02	FILLER	PICTURE X[122] VALUE SPACE.	C98970
47582	02	FILLER	PICTURE X[5] VALUE :PAGE :.	C98970
47584	02	HIST-PAGE-NO	PICTURE 9.	C98970
47590	02	FILLER	PICTURE X VALUE :2:.	C98970
47600	01	HIST-TITLE SYNC.		C98970
47610	02	FILLER	PICTURE X[3] VALUE :5 :.	C98970
47620	02	HIST-TITLE-1.		C98970
47621	03	FILLER	PICTURE X[10] VALUE SPACE.	C98970
47630	02	HIST-TITLE-2.		C98970
47631	03	FILLER	PICTURE X[10] VALUE SPACE.	C98970
47640	02	HIST-TITLE-3	PICTURE X[10] VALUE SPACE.	C98970
47650	02	HIST-TITLE-4	PICTURE X[10] VALUE SPACE.	C98970
47660	02	FILLER	PICTURE X[24] VALUE	C98970
47670		: NO OF OBSERVATIONS >:.		C98970
47680	02	HIST-NO-OF-OBS-RPT	PICTURE ZZZZ9.	C98970
47690	02	FILLER	PICTURE X[13] VALUE	C98970
47700		: VALUE MAX > :.		C98970
47710	02	HIST-VALUE-MAX-RPT	PICTURE ----.9.	C98970
47720	02	FILLER	PICTURE X[13] VALUE	C98970
47730		: VALUE MIN > :.		C98970
47740	02	HIST-VALUE-MIN-RPT	PICTURE ----.9.	C98970
47750	02	FILLER	PICTURE X[18] VALUE	C98970
47760		:	;	C98970
47900	01	HIST-DOI-LINE SYNC.		C98978
47910	02	FILLER	PICTURE X[50] VALUE	C98970
47920		:/-----:.		C98970
47922	02	FILLER	PICTURE X[80] VALUE	C98970
47930		:/-----:.		C98970
47940		:/-----:.		C98970

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47950 01 HIST-LABEL SYNC. C98970
47960 02 FILLER PICTURE X(50) VALUE C98970
47970 :// MIDPNT PCNT CUM FREQ 1...5...10...15...20... C98970
47974 02 FILLER PICTURE X(80) VALUE :.. C98970
47980 - :25...30...35...40...45...50...55...60...65...70...75...80... C98970
47990 - :85...90...95...100#:. C98970
48000 01 HIST-LINE-OUT SYNC. C98970
48010 02 FILLER PICTURE X VALUE :/;. C98970
48020 02 HIST-LINE-RPT PICTURE Z29. C98970
48030 02 FILLER PICTURE X VALUE SPACE. C98970
48040 02 HIST-MID-POINT-RPT PICTURE -----9. C98970
48060 02 HIST-PERCENT-RPT PICTURE Z29.9. C98970
48070 02 FILLER PICTURE X VALUE SPACE. C98970
48080 02 HIST-CUM-RPT PICTURE Z29.9. C98970
48100 02 HIST-FREQ-RPT PICTURE ZZZ29. C98970
48110 02 FILLER PICTURE X VALUE SPACE. C98970
48120 02 HIST-POINT OCCURS 100 TIMES C98970
48130 PICTURE X. C98970
48140 02 FILLER PICTURE X VALUE :#. C98970
48150 01 HIST-OUT-RANGE-REC SYNC. C98970
48160 02 FILLER PICTURE X(35) VALUE C98970
48170 :// NUMBER OF OUT OF RANGE VALUES >:. C98970
48180 02 HIST-OUT-RANGE-RPT PICTURE Z29. C98970
48190 02 FILLER PICTURE X(91) VALUE SPACE. C98970
48191 02 FILLER PICTURE X VALUE :#. C98970
48200 01 HIST-SCALE-LINE SYNC. C98970
48210 02 FILLER PICTURE X(27) VALUE C98970
48220 :// SCALING FACTOR > :. C98970
48230 02 HIST-SCALE-RPT PICTURE Z29. C98970
48240 02 FILLER PICTURE X(099) VALUE SPACE. C98970
48250 02 FILLER PICTURE X VALUE :#. C98970
48300 01 FILLER SYNC. C98970
48310 02 HIST-VALUE OCCURS 1000 TIMES C98970
48320 PICTURE S9999V9 COMPUTATIONAL. C98970
48400 01 TASK7-REC SYNC. C98970
48410 05 TASK7-ISO PICTURE X. C98970
48411 05 FILLER PICTURE X(9). C98970
48420 05 TASK7-ID PICTURE X(1) VALUE :2;. C98970
48430 05 FILLER PICTURE X(1). C98970
48440 05 TASK7-WUC PICTURE X(5). C98970
48450 05 FILLER PICTURE X. C98970
48451 05 TASK7-HMC PICTURE X(3). C98970
48452 05 FILLER PICTURE X. C98970
48460 05 MEAN-RPT PICTURE S9(7)V9. C98970
48470 05 FILLER PICTURE X. C98970
48480 05 VARIANCE-RPT PICTURE S9(7)V9. C98970
48490 05 FILLER PICTURE X(10). C98970
48500 05 FILLER PICTURE X VALUE :#. C98970
50000 PROCEDURE DIVISION. C98970
50010 OPEN INPUT IN-FILE. C98970
50020 OPEN OUTPUT HIST-FILE. C98970
50030 MOVE 1000 TO KNT. C98970
50040 PERFORM RESET-TABLE THRU END-RST-TABLE. C98970
50050 READ IN-FILE, AT END GO TO CLOSE-FILES. C98970
50100 PARA-1. C98970
50110 MOVE 1 TO HIST-NO-OF-OBS. C98970
50120 MOVE WUC TO CUR-WUC. C98970
50130 MOVE HMC TO CUR-HMC. C98970
50140 MOVE DATA-TYPE-NEW TO DATA-TYPE. C98970
50150 MOVE ISCHRONAL-NEW TO ISCHRONAL. C98970
50160 IF DATA-TYPE NOT EQUAL TO ONE GO TO WEEKS-DATA ELSE GO TO C98970
50170 FLT-DATA. C98970
50200 READ1. C98970
50210 READ IN-FILE, AT END GO TO CLOSE-FILES. C98970
50220 IF DATA-TYPE-NEW IS EQUAL TO :9: GO TO CLOSE-FILES. C98970
50230 IF WUC IS NOT EQUAL TO CUR-WUC GO TO PARA-2. C98970
50240 IF HMC IS NOT EQUAL TO CUR-HMC GO TO PARA-2. C98970
50250 ADD 1 TO HIST-NO-OF-OBS. C98970
50260 IF DATA-TYPE NOT EQUAL TO ONE GO TO WEEKS-DATA ELSE GO TO C98970
50270 FLT-DATA. C98970
50300 PARA-2. C98970
50310 PERFORM SET-HISTOG THRU END-SH. C98970
50320 PERFORM RESET-TABLE THRU END-RST-TABLE. C98970
50330 GO TO PARA-1. C98970
50400 RESET-TABLE. C98970
50410 MOVE ZERO TO CNT. C98970
50420 RST. C98970
50430 ADD 1 TO CNT. C98970
50440 MOVE MINUS-ONE TO HIST-VALUE (CNT). C98970
50445 MOVE ZERO TO FREQ-HIST-VALUE (CNT). C98970
50450 IF CNT IS LESS THAN KNT GO TO RST. C98970
50455 MOVE ZERO TO KNT. C98970
50460 END-RST-TABLE. EXIT. C98970
50510 SET-HISTOG. C98970
50590 PERFORM WRITE-HISTOGRAM THRU END-HIST. C98970
50600 IF HIST-FLAG IS EQUAL TO :1: THEN GO TO CF1. C98970
50610 ADD 1 TO NO-OF-HISTS. C98970

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50620  END-SH. EXIT. C98970
51000  WEEKS-DATA. C98970
51010  MOVE ZERO TO CNT. C98970
51020  WEEK-A. C98970
51030  ADD 1 TO CNT. C98970
51040  IF OBS IS EQUAL TO HIST-VALUE [CNT] GO TO WEEK-C. C98970
51050  IF FREQ-HIST-VALUE [CNT] IS EQUAL TO ZERO GO TO WEEK-B. C98970
51060  IF CNT IS LESS THAN 1000 GO TO WEEK-A. C98970
51070  DISPLAY : MORE THAN 1000 FREQUENCY OCCURENCES : UPON CONSOLE. C98970
51080  GO TO CF1. C98970
51090  WEEK-B. C98970
51100  MOVE OBS TO HIST-VALUE [CNT]. C98970
51110  IF CNT IS GREATER THAN KNT THEN MOVE CNT TO KNT. C98970
51120  WEEK-C. C98970
51130  ADD 1 TO FREQ-HIST-VALUE [CNT]. C98970
51140  GO TO READ1. C98970
52000  FLT-DATA. C98970
52010  MOVE ZERO TO CNT. C98970
52020  FLT-A. C98970
52030  ADD 1 TO CNT. C98970
52040  IF OBS-1 IS EQUAL TO HIST-VALUE [CNT] GO TO FLT-C. C98970
52050  IF FREQ-HIST-VALUE [CNT] IS EQUAL TO ZERO GO TO FLT-B. C98970
52060  IF CNT IS LESS THAN 1000 GO TO FLT-A. C98970
52070  DISPLAY : MORE THAN 1000 FREQUENCY OCCURENCES : UPON CONSOLE. C98970
52080  GO TO CF1. C98970
52090  FLT-B. C98970
52100  MOVE OBS-1 TO HIST-VALUE [CNT]. C98970
52110  IF CNT IS GREATER THAN KNT THEN MOVE CNT TO KNT. C98970
52120  FLT-C. C98970
52130  ADD 1 TO FREQ-HIST-VALUE [CNT]. C98970
52140  GO TO READ1. C98970
52200  CLOSE-FILES. C98970
52205  PERFORM SET-HISTOG THRU END-SH. C98970
52207  CF1. C98970
52210  CLOSE IN-FILE, HIST-FILE. C98970
52211  IF HIST-FLAG IS EQUAL TO :1: DISPLAY : HIST ERROR : UPON C98970
52212  CONSOLE. C98970
52215  DISPLAY : NO OF HISTOGRAMS > : NO-OF-HISTS UPON CONSOLE. C98970
52220  DISPLAY : EQU C9897P : UPON CONSOLE. C98970
52230  GORACK. C98970
95000  COMPUTE-MEAN-VARIANCE. C98970
95005  IF HIST-NO-OF-OBS EQUAL TO 1 GO TO CMV-3. C98970
95010  MOVE ZERO TO CNT. C98970
95020  MOVE ZERO TO MEAN. C98970
95030  CMV-1. C98970
95040  ADD 1 TO CNT. C98970
95050  COMPUTE TEMP-COMP > HIST-VALUE [CNT] * FREQ-HIST-VALUE [CNT]. C98970
95060  ADD TEMP-COMP TO MEAN. C98970
95070  IF CNT IS LESS THAN KNT GO TO CMV-1. C98970
95080  DIVIDE HIST-NO-OF-OBS INTO MEAN. C98970
95090  MOVE ZERO TO CNT. C98970
95100  MOVE ZERO TO VARIANCE. C98970
95110  CMV-2. C98970
95120  ADD 1 TO CNT. C98970
95130  COMPUTE TEMP-COMP > [(HIST-VALUE [CNT] - MEAN) ** 2] * C98970
95140  FREQ-HIST-VALUE [CNT]. C98970
95150  ADD TEMP-COMP TO VARIANCE. C98970
95160  IF CNT IS LESS THAN KNT GO TO CMV-2. C98970
95170  COMPUTE VARIANCE > VARIANCE / [HIST-NO-OF-OBS - 1]. C98970
95180  MOVE MEAN TO MEAN-RPT. C98970
95190  MOVE VARIANCE TO VARIANCE-RPT. C98970
95191  GO TO CMV-4. C98970
95192  CMV-3. C98970
95193  MOVE ZERO TO VARIANCE-RPT. C98970
95194  MOVE HIST-VALUE [1] TO MEAN-RPT. C98970
95195  CMV-4. C98970
95290  END-CMV. C98970
97000  WRITE-HISTOGRAM. C98970
97355  PERFORM COMPUTE-MEAN-VARIANCE THRU END-CMV. C98970
97356  MOVE CUR-WUC TO TASK7-WUC. C98970
97357  MOVE CUR-HMC TO TASK7-HMC. C98970
97358  MOVE ISCHRONAL TO TASK7-ISO. C98970
97360  WRITE HIST-REC FROM TASK7-REC. C98970
99990  END-HIST. EXIT. C98970
/* PLACE COBOL SOURCE BEFORE THIS CARD
//CHG,TFGIN DU *,SPACE>[CYL,1,1]]
/* PLACE TFG DATA BEFORE THIS CARD
//TPR,TU12 DU DISP>[OLD,KEEP],VOL>SER>+F1,UNIT>T+F1
//TPR,TU25 DU DISP>[OLD,KEEP],VOL>SER>+F8,UNIT>T+F8
//TPR,TPRIN DU *,SPACE>[TRK,1,1]]
T/P TU12 10100202020
T/P TU25 10100502050
/* PLACE T/P CONTROL CARDS BEFORE THIS CARD

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1440 CDS

T12
T25

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//T9897A JOB 01: WANG :PKTY>02, TYPRUN>HOLD
//C9897A EXEC P9005L, TIME>03, ACCT>035323007
//CHG, TU13 DU DISP>L, PASSJ, UNIT>[T+F2, 1, DEFER], DSN>+B, 9897460, CT13 1
// VOL>SER>[+F2, A+F2, B+F2, C+F2, D+F2, E+F2, F+F2, G+F2, H+F2, CT13 2
// I+F2, J+F2, K+F2, L+F2, M+F2, N+F2, O+F2, P+F2, Q+F2, R+F2, S+F2] T13 3
//CHG, TU14 DU DISP>L, PASSJ, UNIT>[T+F3, 1, DEFER], DSN>+C, 9897431, CT14 1
// VOL>SER>[+F3, A+F3, B+F3, C+F3, D+F3, E+F3, F+F3, G+F3, H+F3, CT14 2
// I+F3, J+F3, K+F3, L+F3, M+F3, N+F3, O+F3, P+F3, Q+F3, R+F3, S+F3] T14 3
//CHG, TU15 DU DISP>L, PASSJ, UNIT>[T+F4, 1, DEFER], DSN>+D, 9897431, CT15 1
// VOL>SER>[+F4, A+F4, B+F4, C+F4, D+F4, E+F4, F+F4, G+F4, H+F4, CT15 2
// I+F4, J+F4, K+F4, L+F4, M+F4, N+F4, O+F4, P+F4, Q+F4, R+F4, S+F4] T15 3
//CHG, TU22 DU DISP>L, KEEPJ, UNIT>[T+F5, 1, DEFER], DSN>+E, 9897463, CT22 1
// VOL>SER>[+F5, A+F5, B+F5, C+F5, D+F5, E+F5, F+F5, G+F5, H+F5, CT22 2
// I+F5, J+F5, K+F5, L+F5, M+F5, N+F5, O+F5, P+F5, Q+F5, R+F5, S+F5] T22 3
//CHG, INPUT DD *.SPACE>[CYL(11,1)] 1440 CDS
00000 COMLINE COMPILE G. WANG. C98970
01000 IDENTIFICATION DIVISION. C98970
01010 PROGRAM-IO. C9897
01020 AUTHOR. A. J. ROWKER C98970
01030 INSTALLATION. GENERAL DYNAMICS/CONVAIR. C98970
01040 DATE-WRITTEN. 25 JULY 72. C98970
01050 REMARKS. PROGRAM VII C98970
01060 ADD GROUP IDENTIFICATION C98970
01070 AND MERGE DATA. C98970
02000 ENVIRONMENT DIVISION. C98970
02010 CONFIGURATION SECTION. C98970
02020 SOURCE-COMPUTER. IBM-360. C98970
02030 OBJECT-COMPUTER. IBM-360. C98970
02100 INPUT-OUTPUT SECTION. C98970
02110 FILE-CONTROL. C98970
02120 SELECT IN-FILE-1 ASSIGN TO UT-S-TU13 C98970
02130 RESERVE 1 ALTERNATE AREA. C98970
02140 SELECT IN-FILE-2 ASSIGN TO UT-S-TU14 C98970
02150 RESERVE 1 ALTERNATE AREA. C98970
02160 SELECT IN-FILE-3 ASSIGN TO UT-S-TU15 C98970
02170 RESERVE 1 ALTERNATE AREA. C98970
02180 SELECT CARD-FILL ASSIGN TO DA-S-DT01 C98970
02190 RESERVE 1 ALTERNATE AREA. C98970
02200 SELECT OUTFILE ASSIGN TO UT-S-TU22 C98970
02210 RESERVE 1 ALTERNATE AREA. C98970
10000 DATA DIVISION. C98970
10010 FILE SECTION. C98970
11100 FD IN-FILE-1 C98970
11120 RECORDING MODE IS F C98970
11130 BLOCK CONTAINS 60 RECORDS C98970
11140 RECORD CONTAINS 50 CHARACTERS C98970
11150 LABEL RECORDS ARE OMITTED C98970
11160 DATA RECORDS ARE IN-REC-1. C98970
11170 01 IN-REC-1 PICTURE X(50). C98970
12100 FD IN-FILE-2 C98970
12120 RECORDING MODE IS F C98970
12130 BLOCK CONTAINS 60 RECORDS C98970
12140 RECORD CONTAINS 50 CHARACTERS C98970
12150 LABEL RECORDS ARE OMITTED C98970
12160 DATA RECORDS ARE IN-REC-2. C98970
12170 01 IN-REC-2 PICTURE X(50). C98970
13100 FD IN-FILE-3 C98970
13120 RECORDING MODE IS F C98970
13130 BLOCK CONTAINS 60 RECORDS C98970
13140 RECORD CONTAINS 50 CHARACTERS C98970
13150 LABEL RECORDS ARE OMITTED C98970
13160 DATA RECORDS ARE IN-REC-3. C98970
13170 01 IN-REC-3 PICTURE X(50). C98970
14100 FD CARD-FILE C98970
14120 RECORDING MODE IS F C98970
14130 BLOCK CONTAINS 20 RECORDS C98970
14140 RECORD CONTAINS 80 CHARACTERS C98970
14150 LABEL RECORDS ARE STANDARD C98970
14160 DATA RECORDS ARE CARD-REC. C98970
14170 01 CARD-REC PICTURE X(80). C98970
15100 FD OUTFILE C98970
15120 RECORDING MODE IS F C98970
15130 BLOCK CONTAINS 60 RECORDS C98970
15140 RECORD CONTAINS 50 CHARACTERS C98970
15150 LABEL RECORDS ARE OMITTED C98970
15160 DATA RECORDS ARE OUT-REC. C98970
15170 01 OUT-REC PICTURE X(50). C98970
30000 WORKING-STORAGE SECTION. C98970
30010 77 LAST-WUC-IN PICTURE X(5) VALUE SPACE. C98970
30020 77 INDEX-1 COMPUTATIONAL PICTURE S999 VALUE ZERO. C98970
30030 77 INDEX-2 COMPUTATIONAL PICTURE S999 VALUE ZERO. C98970
30040 77 MAX-NUM-WUC COMPUTATIONAL PICTURE S999. C98970
30050 77 MAX-SPEC-WUC COMPUTATIONAL PICTURE S999. C98970
30060 77 NUM-REC-1 COMPUTATIONAL PICTURE S9(6) VALUE ZERO. C98970
30070 77 NUM-REC-2 COMPUTATIONAL PICTURE S9(6) VALUE ZERO. C98970
30080 77 NUM-REC-3 COMPUTATIONAL PICTURE S9(6) VALUE ZERO. C98970
30090 77 NUM-OUT-REC COMPUTATIONAL PICTURE S9(6) VALUE ZERO. C98970

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[illegible]

52000	PROCESS-WUC.	C98970
52010	IF WUC-IN IS EQUAL TO LAST-WUC-IN GO TO WRITE-OUTREC.	C98970
52015	MOVE SPEC-WUC-TABLE [1] TO WUC-TEMP.	C98970
52020	IF WUC-IN-2 IS EQUAL TO WUC-TEMP-2.	C98970
52030	GO TO PROCESS-SPECIAL-WUC.	C98970
52040	MOVE ZERO TO INDEX-1.	C98970
52050	TEST-WUC.	C98970
52060	ADD 1 TO INDEX-1.	C98970
52065	MOVE WUC-TABLE-5 [INDEX-1] TO WUC-TEMP.	C98970
52070	IF WUC-IN-2 IS EQUAL TO WUC-TEMP-2.	C98970
52080	GO TO SAME-WUC-2.	C98970
52090	IF INDEX-1 IS LESS THAN MAX-NUM-WUC GO TO TEST-WUC.	C98970
52100	MOVE SPACE TO LAST-WUC-IN.	C98970
52110	GO TO END-P-W.	C98970
52200	SAME-WUC-2.	C98970
52205	MOVE WUC-TABLE-5 [INDEX-1] TO WUC-TEMP.	C98970
52210	IF WUC-TEMP-3DIG IS EQUAL TO SPACE	C98970
52220	GO TO WRITE-OUTREC-1.	C98970
52230	IF WUC-IN-3 IS EQUAL TO WUC-TEMP-3	C98970
52240	WRITE-OUTREC-1.	C98970
52250	ADD 1 TO INDEX-1.	C98970
52260	IF INDEX-1 IS GREATER THAN MAX-NUM-WUC	C98970
52270	DISPLAY : PROBLEM IN SAME-WUC-2 : UPON CONSOLE	C98970
52280	GO TO CLOSE-FILES.	C98970
52290	GO TO SAME-WUC-2.	C98970
52400	WRITE-OUTREC.	C98970
52410	MOVE CUR-GRP-ID TO GROUP-ID.	C98970
52420	MOVE CUR-WUC TO GROUP-WUC.	C98970
52430	WRITE OUT-REC FROM DATA-IN-REC.	C98970
52440	ADD 1 TO NUM-OUT-REC.	C98970
52450	MOVE WUC-IN TO LAST-WUC-IN.	C98970
52460	GO TO END-P-W.	C98970
52500	PROCESS-SPECIAL-WUC.	C98970
52510	MOVE 1 TO INDEX-2.	C98970
52520	IF WUC-IN IS EQUAL SPEC-WUC-TABLE [INDEX-2] GO TO SPEC-WUC-1.	C98970
52600	PROCESS-SPEC-WUC-3.	C98970
52610	ADD 1 TO INDEX-2.	C98970
52615	MOVE SPEC-WUC-TABLE [INDEX-2] TO WUC-TEMP.	C98970
52620	IF WUC-IN-3 IS EQUAL TO WUC-TEMP-3	C98970
52630	GO TO SPEC-WUC-1.	C98970
52640	IF INDEX-2 IS LESS THAN MAX-SPEC-WUC GO TO	C98970
52650	PROCESS-SPEC-WUC-3.	C98970
52660	MOVE SPACE TO LAST-WUC-IN.	C98970
52670	GO TO END-P-W.	C98970
52700	SPEC-WUC-1.	C98970
52710	COMPUTE CUR-GRP-ID > INDEX-2 < MAX-NUM-WUC.	C98970
52720	MOVE SPEC-WUC-TABLE [INDEX-2] TO CUR-WUC.	C98970
52730	GO TO WRITE-OUTREC.	C98970
52800	WRITE-OUTREC-1.	C98970
52810	MOVE INDEX-1 TO CUR-GRP-ID.	C98970
52820	MOVE WUC-TABLE-5 [INDEX-1] TO CUR-WUC.	C98970
52830	GO TO WRITE-OUTREC.	C98970
52990	END-P-W. EXIT.	C98970
55000	CLOSE-FILES.	C98970
55010	MOVE NUM-REC-1 TO TEMP-NUM.	C98970
55020	DISPLAY : NO. RECS FILE 1 : TEMP-NUM UPON CONSOLE.	C98970
55030	MOVE NUM-REC-2 TO TEMP-NUM.	C98970
55040	DISPLAY : NO. RECS FILE 2 : TEMP-NUM UPON CONSOLE.	C98970
55050	MOVE NUM-REC-3 TO TEMP-NUM.	C98970
55060	DISPLAY : NO. RECS FILE 3 : TEMP-NUM UPON CONSOLE.	C98970
55070	MOVE NUM-OUT-REC TO TEMP-NUM.	C98970
55080	DISPLAY : NO. OUTRECS : TEMP-NUM UPON CONSOLE.	C98970
55100	COMPUTE INDEX-1 > NUM-OUT-REC - NUM-OUT-REC / 60 * 60.	C98970
55110	IF INDEX-1 IS EQUAL TO ZERO GO TO CF-1.	C98970
55120	CF-2.	C98970
55130	WRITE OUT-REC FROM NINE.	C98970
55140	ADD 1 TO INDEX-1.	C98970
55150	IF INDEX-1 IS LESS THAN 60 GO TO CF-2.	C98970
55200	CF-1.	C98970
55210	CLOSE IN-FILE-1.	C98970
55220	IN-FILE-2.	C98970
55230	IN-FILE-3.	C98970
55240	CARD-FILE.	C98970
55250	OUTFILE WITH LOCK.	C98970
55260	DISPLAY : E0J C9897 : UPON CONSOLE.	C98970
55270	GOBACK.	C98970

```

/*          PLACE COMOL SOURCE BEFORE THIS CARD
//CHG.TFGIN  DU  *,SPACE>[CYL,[1,1]]
00000      GET TFG
010001 019999 REPLACE
TFG DT01  11  0202080
43
11J
11K
11
12H
12
13C
13J
13
14
23K
23M
23N
23O
23S
23
41F
41
42E
42F
42G
42
44
45E
45J
45
46A
46C
46G
46H
46J
46
47
49A
49
51
52
55
63
65
71
75
93
97
11
74000
74A
74B
74C
74D
74F
74H
74K
74L
74P
74Q
*END
/*          PLACE TFG DATA BEFORE THIS CARD
//TPR.TU13  DU  DISP>[OLD,KEEP],VOL>SER>+F2,UNIT>T+F2      T13
//TPR.TU14  DU  DISP>[OLD,KEEP],VOL>SER>+F3,UNIT>T+F3      T14
//TPR.TU15  DU  DISP>[OLD,KEEP],VOL>SER>+F4,UNIT>T+F4      T15
//TPR.TU22  DU  DISP>[OLD,KEEP],VOL>SER>+F5,UNIT>T+F5      T22
//TPR.TPRIN DU  *,SPACE>[TRK,[1,1]]
T/P TU13  10100502050
T/P TU14  10100502050
T/P TU15  10100502050
T/P TU22  10100502050
T/P DT01  10100502080
/*          PLACE T/P CONTROL CARDS BEFORE THIS CARD
//C9897S EXEC P9622N,=199,TIME>02,ACCT>D35323007
//CHG.SORTIN DU  DISP>[KEEP],UNIT>[T+F5,1,DEFER],          CT22  1
//          DSN>+E,9897463,                                CT22  2
//          VOL>SER>[+F5,A+F5,B+F5,C+F5,D+F5,E+F5,F+F5,G+F5,H+F5, CT22  3
//          I+F5,J+F5,K+F5,L+F5,M+F5,N+F5,O+F5,P+F5,Q+F5,R+F5,S+F5],CT22  4
//          DCB>[LRECL>0050,BLKSIZE>3000],LABEL>[NSL,RETPD>099]
//CHG.SORTOUT DU  DISP>[KEEP],UNIT>[T+F1,1,DEFER],DSN>+A,9897464, CT12  1
//          VOL>SER>[+F1,A+F1,B+F1,C+F1,D+F1,E+F1,F+F1,G+F1,H+F1, CT12  2
//          I+F1,J+F1,K+F1,L+F1,M+F1,N+F1,O+F1,P+F1,Q+F1,R+F1,S+F1],CT12  3
//          DCB>[LRECL>0050,BLKSIZE>3000]
//CHG.SYSIN  DU  *,DCB>BLKSIZE>0080,SPACE>[TRK,[1,1]]

```

SORT FIELDS>[001,001,CH,A,002,002,CH,A,013,005,CH,A,019,003,CH,D, C
 011,001,CH,A],SIZE>E0050000
 MODS E15>[E15,008,SortLib,N],E18>[E18,024,SortLib,N]
 /*

```

//T9897H JOB 01: WANG :;PTY>02,TPRUN>HOLD
//C9897H EXEC P9655L,TIME>05,ACCT>D35323007
//CHG.IU12 DU DISP>[PASS],UNIT>[T+F1,1,DEFER],DSN>+A,9897464, CT12 1
// VOL>SER>[F1,A+F1,B+F1,C+F1,D+F1,E+F1,F+F1,G+F1,H+F1, CT12 2
// I+F1,J+F1,K+F1,L+F1,M+F1,N+F1,O+F1,P+F1,Q+F1,R+F1,S+F1] T12 3
//CHG.TU23 DU DSN>+P,9897465,SPACE>[CYL,[009,001]] D23-OUT
//CHG.TU24 DU USN>+P,9897466,SPACE>[CYL,[009,001]] D24-OUT
//CHG.INPUT DU *.SPACE>[CYL,[1,1]] 1440 CDS
00000 COMLINE COMPILE G. WANG C98970
01000 IDENTIFICATION DIVISION. C98970
01010 PROGRAM-IU. C9897
01020 AUTHOR. A. J. ROWKER. C98970
01030 INSTALLATION. GENERAL DYNAMICS/CONVAIR. C98970
01040 DATE-WRITTEN. 27 JULY 72. C98970
01050 REMARKS. C98970
01060 TASK VII-5 C98970
01070 COMPUTE PASS NO 1. C98970
02000 ENVIRONMENT DIVISION. C98970
02010 CONFIGURATION SECTION. C98970
02020 SOURCE-COMPUTER. IBM-360. C98970
02030 OBJECT-COMPUTER. IBM-360. C98970
02100 INPUT-OUTPUT SECTION. C98970
02110 FILE-CONTROL. C98970
02120 SELECT IN-FILE-1 ASSIGN TO UT-S-TU12 C98970
02130 RESERVE 1 ALTERNATE AREA. C98970
02140 SELECT FILE-2 ASSIGN TO UT-S-TU23 C98970
02150 RESERVE 1 ALTERNATE AREA. C98970
02160 SELECT FILE-3 ASSIGN TO UT-S-TU24 C98970
02170 RESERVE 1 ALTERNATE AREA. C98970
10000 DATA DIVISION. C98970
10010 FILE SECTION. C98970
11000 FD IN-FILE-1 C98970
11100 C98970
11110 RECURRING MODE IS F C98970
11120 BLOCK CONTAINS 60 RECORDS C98970
11130 RECORD CONTAINS 50 CHARACTERS C98970
11140 LABEL RECORDS ARE OMITTED C98970
11150 DATA RECORDS ARE IN-REC-1. C98970
11160 01 IN-REC-1 SYNC. C98970
11170 05 ISO PICTURE X. C98970
11180 05 GNP-ID PICTURE XX. C98970
11186 05 FILLER PICTURE X(7). C98970
11190 05 JU PICTURE X. C98970
11200 05 FILLER PICTURE X. C98970
11210 05 WUC PICTURE X(5). C98970
11220 05 FILLER PICTURE X. C98970
11230 05 DATA-IN. C98970
11240 10 FILLER PICTURE X(4). C98970
11250 10 NORM-MA PICTURE 9(7)V9. C98970
11260 10 FILLER PICTURE X. C98970
11270 10 VAR-NORM-MA PICTURE 9(7)V9. C98970
11280 10 FILLER PICTURE X(9). C98970
11290 05 FILLER PICTURE XX. C98970
12100 FD FILE-2 C98970
12110 C98970
12120 RECURRING MODE IS F C98970
12130 BLOCK CONTAINS 60 RECORDS C98970
12140 RECORD CONTAINS 50 CHARACTERS C98970
12150 LABEL RECORDS ARE OMITTED C98970
12160 DATA RECORDS ARE REC-2. C98970
12170 01 REC-2 SYNC PICTURE X(50). C98970
13100 FD FILE-3 C98970
13110 C98970
13120 RECURRING MODE IS F C98970
13130 BLOCK CONTAINS 60 RECORDS C98970
13140 RECORD CONTAINS 50 CHARACTERS C98970
13150 LABEL RECORDS ARE OMITTED C98970
13160 DATA RECORDS ARE REC-3. C98970
13170 01 REC-3 SYNC PICTURE X(50). C98970
30000 WORKING-STORAGE SECTION. C98970
30010 77 NORM-UMA-NUM COMPUTATIONAL PICTURE S9(8)V9. C98970
30020 77 MH-REP-PE-N COMPUTATIONAL PICTURE S9(8)V9. C98970
30030 77 MH-REP-HP-N COMPUTATIONAL PICTURE S9(8)V9. C98970
30040 77 NREP-PE-D COMPUTATIONAL PICTURE S9(8)V9. C98970
30050 77 NREP-HP-D COMPUTATIONAL PICTURE S9(8)V9. C98970
30060 77 NUM-REC-1 COMPUTATIONAL PICTURE S9(8) VALUE ZERO. C98970
30070 77 NUM-REC-2 COMPUTATIONAL PICTURE S9(8) VALUE ZERO. C98970
30080 77 NUM-REC-3 COMPUTATIONAL PICTURE S9(8) VALUE ZERO. C98970
30090 77 CNT COMPUTATIONAL PICTURE S9(8). C98970
30100 77 MH-MA-NUMA COMPUTATIONAL PICTURE S9(8)V9. C98970
30110 77 BF COMPUTATIONAL PICTURE S999 VALUE <60. C98970
30120 77 CURISO PICTURE X VALUE SPACE. C98970

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[illegible]

50500	TEST-HMC.	C98970
50510	IF HMC-1 IS NOT EQUAL TO HMC-2 GO TO READ-DATA-IN.	C98970
50520	COMPUTE MH-MA-NUMA > MH-MA-NUMA < MH-MA * NUMA.	C98970
50530	ADD NUMA TO N1.	C98970
50540	ADD NUMA TO N2.	C98970
50550	COMPUTE C > C < MH-MA * NUMA.	C98970
50560	COMPUTE MH-REP-PE-N > MH-REP-PE-N < MH-MA * NREP-PE.	C98970
50570	COMPUTE MH-REP-HP-N > MH-REP-HP-N < MH-MA * NREP-HP.	C98970
50580	ADD NREP-PE TO NREP-PE-U.	C98970
50590	ADD NREP-HP TO NREP-HP-D.	C98970
50600		C98970
50690	GO TO READ-DATA-IN.	C98970
51000	NEW-WUC.	C98970
51010	MOVE CURISO TO ISO-2.	C98970
51020	MOVE CURID TO GRP-ID-2.	C98970
51025	MOVE CURWUC TO WUC-REC-2.	C98970
51030	WRITE REC-2 FROM WS-REC-2.	C98970
51040	ADD 1 TO NUM-REC-2.	C98970
51050	PERFORM RESET-1.	C98970
51060	MOVE WUC TO CURWUC.	C98970
51090	GO TO TEST-ID.	C98970
51100	NEW-GROUP.	C98970
51110	IF N1 IS EQUAL TO ZERO DISPLAY : N1 IS ZERO : CURWUC CURID	C98970
51120	UPON CONSOLE GO TO CLOSE-FILES.	C98970
51130	COMPUTE MH-UMA > MH-MA-NUMA / N1.	C98970
51140	COMPUTE NORM-UMA > NORM-UMA-NUM / N1.	C98970
51150	IF NREP-PE-D IS EQUAL TO ZERO MOVE ZERO TO MH-REP-PE	C98970
51160	GO TO NG-1.	C98970
51170	COMPUTE MH-REP-PE > MH-REP-PE-N / NREP-PE-D.	C98970
51175	NG-1.	C98970
51180	IF NREP-HP-D IS EQUAL TO ZERO MOVE ZERO TO MH-REP-HP	C98970
51190	GO TO NG-2.	C98970
51200	COMPUTE MH-REP-HP > MH-REP-HP-N / NREP-HP-D.	C98970
51205	NG-2.	C98970
51210	MOVE CURISO TO ISO-3.	C98970
51220	MOVE CURID TO GRP-ID-3.	C98970
51230	WRITE REC-3 FROM WS-REC-3.	C98970
51240	ADD 1 TO NUM-REC-3.	C98970
51250	PERFORM RESET-2.	C98970
51260	MOVE CURISO TO ISO-2.	C98970
51270	MOVE CURID TO GRP-ID-2.	C98970
51275	MOVE CURWUC TO WUC-REC-2.	C98970
51280	WRITE REC-2 FROM WS-REC-2.	C98970
51285	PERFORM RESET-1.	C98970
51290	ADD 1 TO NUM-REC-2.	C98970
51360	NEW-GROUP-END. EXIT.	C98970
51365	NEW-GROUP-CONTINUE.	C98970
51370	MOVE WUC TO CURWUC. MOVE GRP-ID TO CURID.	C98970
51380	MOVE ISO TO CURISO.	C98970
51390	GO TO TEST-ID.	C98970
52000	CLOSE-DATA.	C98970
52010	PERFORM NEW-GROUP THRU NEW-GROUP-END.	C98970
52100	MOVE NUM-REC-1 TO TEMP-NUM.	C98970
52110	DISPLAY : NO. RECS FILE : TEMP-NUM UPON CONSOLE.	C98970
52120	MOVE NUM-REC-2 TO TEMP-NUM.	C98970
52130	DISPLAY : NO. RECS FILE 2 : TEMP-NUM UPON CONSOLE.	C98970
52140	MOVE NUM-REC-3 TO TEMP-NUM.	C98970
52150	DISPLAY : NO. RECS FILE 3 : TEMP-NUM UPON CONSOLE.	C98970
52200	CLOSE-FILES.	C98970
52210	PERFORM NINE-FILL THRU END-NF.	C98970
52220	CLOSE IN-FILE-1.	C98970
52230	FILE-2.	C98970
52240	FILE-3 WITH LOCK.	C98970
52250	DISPLAY : E0J 9897 : UPON CONSOLE.	C98970
52290	GORACK.	C98970
53000	RESET-1.	C98970
53010	MOVE ZERO TO N2.	C98970
53020	MOVE ZERO TO C.	C98970
53100	RESET-2.	C98970
53110	MOVE ZERO TO N1.	C98970
53120	MOVE ZERO TO NORM-UMA-NUM.	C98970
53130	MOVE ZERO TO MH-MA-NUMA.	C98970
53140	MOVE ZERO TO MH-REP-PE-N.	C98970
53150	MOVE ZERO TO MH-REP-HP-N.	C98970
53160	MOVE ZERO TO NREP-PE-D.	C98970
53170	MOVE ZERO TO NREP-HP-D.	C98970
53200	NINE-FILL.	C98970
53300	NF-2.	C98970
53310	COMPUTE CNT > NUM-REC-2 - NUM-REC-2 / BF * BF.	C98970
53320	IF CNT IS EQUAL TO ZERO GO TO NF-3.	C98970
53330	NF-4.	C98970
53340	WRITE REC-2 FROM NINE.	C98970
53350	ADD 1 TO CNT.	C98970
53360	IF CNT IS LESS THAN BF GO TO NF-4.	C98970
53400	NF-3.	C98970
53410	COMPUTE CNT > NUM-REC-3 - NUM-REC-3 / BF * BF.	C98970
53420	IF CNT IS EQUAL TO ZERO GO TO END-NF.	C98970

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53430 NF-5.
53440 WRITE RLC-3 FROM NINE.
53450 ADD 1 TO CNT.
53460 IF CNT IS LESS THAN BF GO TO NF-5.
53490 END-NF. EXII.
/* PLACE CONUL SOURCE BEFORE THIS CARD
//CHG,IFGIN DU *,SPACE>[CYL,[1,1]]
/* PLACE TFG DATA BEFORE THIS CARD
//TPR,TU12 DU DISP>[OLD,KEEP],VOL>SER>+F1,UNIT>T+71
//TPR,TU23 DU DISP>[OLD,PASS]
//TPR,TU24 DU DISP>[OLD,PASS]
//TPR,TPRIN DU *,SPACE>[TRK,[1,1]]
T/P TU12 10100502050
T/P TU23 10100502050
T/P TU24 10100502050
/* PLACE T/P CONTROL CARUS BEFORE THIS CARD

//C98976 EXEC P965SL,TIME>05,ACCT>D35323007
//CHG,TU12 DD DISP>[PASS],UNIT>[T+F1,1,DEFER],DSN>+A.9897466, CT12 1
// VOL>SER>[+F1,A+F1,B+F1,C+F1,D+F1,E+F1,F+F1,G+F1,H+F1, CT12 2
// I+F1,J+F1,K+F1,L+F1,M+F1,N+F1,O+F1,P+F1,Q+F1,R+F1,S+F1] T12 3
//CHG,TU23 DU DSN>+P.9897466,DISP>[OLD,PASS] D23-IN
//CHG,TU24 DU DSN>+P.9897466,DISP>[OLD,PASS] D24-IN
//CHG,TU25 DU DSN>+P.9897467,SPACE>[CYL,[009,001]] D25-OUT
//CHG,INPUT DU *,SPACE>[CYL,[1,1]] 1440 CDS
00000 COMBINE COMPILE G. WANG
01000 IDENTIFICATION DIVISION.
01010 PROGRAM-ID. C9897
01020 AUTHOR. A. J. ROWKEN.
01030 INSTALLATION. GENERAL DYNAMICS/CONVAIR.
01040 DATE-WRITTEN. 27 JUL 72.
01050 REMARKS.
01060 TASK VII-6
01070 COMPUTE PASS NO 2.
02000 ENVIRONMENT DIVISION.
02010 CONFIGURATION SECTION.
02020 SOURCE-COMPUTER. IBM-360.
02030 OBJECT-COMPUTER. IBM-360.
02100 INPUT-OUTPUT SECTION.
02110 FILE-CONTROL.
02120 SELECT IN-FILE-1 ASSIGN TO UT-S-TU12
02130 RESERVE 1 ALTERNATE AREA.
02140 SELECT FILE-2 ASSIGN TO UT-S-TU23
02150 RESERVE 1 ALTERNATE AREA.
02160 SELECT FILE-3 ASSIGN TO UT-S-TU24
02170 RESERVE 1 ALTERNATE AREA.
02180 SELECT OUT-FILE ASSIGN TO UT-S-TU25
02190 RESERVE 1 ALTERNATE AREA.
10000 DATA DIVISION.
10010 FILE SECTION.
11000 FD IN-FILE-1
11110
11120 RECORDING MODE IS F
11130 BLOCK CONTAINS 60 RECORDS
11140 RECORD CONTAINS 50 CHARACTERS
11150 LABEL RECORDS ARE OMITTED
11160 DATA RECORDS ARE IN-REC-1.
11170 01 IN-REC-1 SYNC.
11180 05 ISO PICTURE X.
11184 05 GNP-ID PICTURE XX.
11185 05 FILLER PICTURE X.
11186 05 WUC-IN PICTURE X(5).
11187 05 FILLER PICTURE X.
11190 05 JU PICTURE X.
11200 05 FILLER PICTURE X.
11210 05 WUC PICTURE X(5).
11220 05 FILLER PICTURE X.
11230 05 DATA-IN.
11240 10 FILLER PICTURE X(4).
11250 10 NORM-MA PICTURE 9(7)V9.
11260 10 FILLER PICTURE X.
11270 10 VAR-NORM-MA PICTURE 9(7)V9.
11280 10 FILLER PICTURE X(9).
11290 05 FILLER PICTURE XX.
12100 FD FILE-2
12110
12120 RECORDING MODE IS F
12130 BLOCK CONTAINS 60 RECORDS
12140 RECORD CONTAINS 50 CHARACTERS
12150 LABEL RECORDS ARE OMITTED
12160 DATA RECORDS ARE REC-2.
12170 01 REC-2 SYNC PICTURE X(50).

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13100	FD	FILE-3		C98970
13110				C98970
13120		RECORDING MODE IS F		C98970
13130		BLOCK CONTAINS 60 RECORDS		C98970
13140		RECORD CONTAINS 50	CHARACTERS	C98970
13150		LABEL RECORDS ARE OMITTED		C98970
13160		DATA RECORDS ARE REC-3.		C98970
13170	01	REC-3 SYNC	PICTURE X(50).	C98970
14000	FD	OUT-DATA-FILE		C98970
14010		RECORDING MODE IS F		C98970
14020		BLOCK CONTAINS 20 RECORDS		C98970
14030		RECORD CONTAINS 100	CHARACTERS	C98970
14040		LABEL RECORDS ARE OMITTED		C98970
14050		DATA RECORDS ARE OUT-DATA-REC.		C98970
14060	01	OUT-DATA-REC SYNC	PICTURE X(100).	C98970
30000		WORKING-STORAGE SECTION.		C98970
30010	77	NORM-UMA-NUM COMPUTATIONAL	PICTURE S9(8)V9.	C98970
30020	77	MH-REP-PE-N COMPUTATIONAL	PICTURE S9(8)V9.	C98970
30030	77	MH-REP-HP-N COMPUTATIONAL	PICTURE S9(8)V9.	C98970
30040	77	NREP-PE-D COMPUTATIONAL	PICTURE S9(8)V9.	C98970
30050	77	NREP-HP-D COMPUTATIONAL	PICTURE S9(8)V9.	C98970
30060	77	NUM-REC-1 COMPUTATIONAL	PICTURE S9(8) VALUE ZERO.	C98970
30070	77	NUM-REC-2 COMPUTATIONAL	PICTURE S9(8) VALUE ZERO.	C98970
30080	77	NUM-REC-3 COMPUTATIONAL	PICTURE S9(8) VALUE ZERO.	C98970
30090	77	CNT COMPUTATIONAL	PICTURE S9(8).	C98970
30100	77	MH-MA-NUMA COMPUTATIONAL	PICTURE S9(8)V9.	C98970
30110	77	BF COMPUTATIONAL	PICTURE S999 VALUE <60.	C98970
30120	77	CURISU	PICTURE X VALUE SPACE.	C98970
30130	77	CURID	PICTURE XX VALUE SPACE.	C98970
30140	77	CURWUC	PICTURE X(5) VALUE SPACE.	C98970
30150	77	ONE	PICTURE X VALUE :1.	C98970
30160	77	TWO	PICTURE X VALUE :2.	C98970
30170	77	THREE	PICTURE X VALUE :3.	C98970
30180	77	TEMP-NUM	PICTURE 9C(A).	C98970
30200	01	DATA-1 SYNC.		C98970
30210	05	HMC-1	PICTURE XXX.	C98970
30220	05	FILLER	PICTURE X.	C98970
30230	05	NUMA	PICTURE 9(7)V9.	C98970
30240	05	FILLER	PICTURE X.	C98970
30250	05	NREP-HP	PICTURE 9(7)V9.	C98970
30260	05	FILLER	PICTURE X.	C98970
30270	05	NREP-PE	PICTURE 9(7)V9.	C98970
30300	01	DATA-2 SYNC.		C98970
30310	05	HMC-2	PICTURE XXX.	C98970
30320	05	FILLER	PICTURE X.	C98970
30330	05	MH-MA	PICTURE 9(7)V9.	C98970
30340	05	FILLER	PICTURE X.	C98970
30350	05	VAR-MH-MA	PICTURE 9(7)V9.	C98970
30360	05	FILLER	PICTURE X(9).	C98970
32170	01	WS-REC-2.		C98970
32180	05	ISO-2	PICTURE X.	C98970
32190	05	GRP-ID-2	PICTURE XX.	C98970
32200	05	FILLER	PICTURE X(9) VALUE SPACE.	C98970
32210	05	WUC-REC-2	PICTURE X(5).	C98970
32220	05	FILLER	PICTURE X(5) VALUE SPACE.	C98970
32230	05	N2	PICTURE 9(7)V9.	C98970
32240	05	FILLER	PICTURE X VALUE SPACE.	C98970
32250	05	C	PICTURE 9(7)V9.	C98970
32260	05	FILLER	PICTURE X(11) VALUE	C98970
32270		:	;;.	C98970
33170	01	WS-REC-3.		C98970
33180	05	ISO-3	PICTURE X.	C98970
33190	05	GRP-ID-3	PICTURE XX.	C98970
33200	05	FILLER	PICTURE X VALUE SPACE.	C98970
33210	05	MH-UMA	PICTURE 9(7)V9.	C98970
33220	05	FILLER	PICTURE X VALUE SPACE.	C98970
33230	05	N1	PICTURE 9(7)V9.	C98970
33240	05	FILLER	PICTURE X VALUE SPACE.	C98970
33250	05	NORM-UMA	PICTURE 9(7)V9.	C98970
33260	05	FILLER	PICTURE X VALUE SPACE.	C98970
33270	05	MH-REP-PE	PICTURE 9(7)V9.	C98970
33280	05	FILLER	PICTURE X VALUE SPACE.	C98970
33290	05	MH-REP-HP	PICTURE 9(7)V9.	C98970
33300	05	FILLER	PICTURE XX VALUE :1.	C98970
33400	01	PAGE-NUM COMPUTATIONAL	PICTURE S99 VALUE ZERO.	C98970
33410	01	LINES-PRINT COMPUTATIONAL	PICTURE S9(4) VALUE ZERO.	C98970
33420	01	X1 COMPUTATIONAL	PICTURE S9(8)V9.	C98970
33430	01	VAR-MH-UMA-D COMPUTATIONAL	PICTURE S9(8)V9.	C98970
33440	01	VAR-MH-UMA COMPUTATIONAL	PICTURE S9(8)V9.	C98970
33450	01	PAGE-L/11 COMPUTATIONAL	PICTURE S999 VALUE <100.	C98970
33460	01	A COMPUTATIONAL	PICTURE S9(8)V9.	C98970
33470	01	B COMPUTATIONAL	PICTURE S9(8)V9.	C98970
33480	01	VAR-NORM-UMA-D COMPUTATIONAL	PICTURE S9(8)V9.	C98970
33500	01	VAR-NORM-UMA COMPUTATIONAL	PICTURE S9(8)V9.	C98970
40000	01	NEW-PAGE-REC SYNC.		C98970
40010	05	FILLER	PICTURE X(50) VALUE	C98970
40020		:1	RESULTS OF PROCESSING MAIN:.	C98970

40030	05	FILLER	PICTURE X(40) VALUE	C98970
40040		:TENANCE MANHOUR AND NORM DATA	PAGE 1.	C98970
40050	05	PAGE-NO-RPT	PICTURE Z9.	C98970
40060	05	FILLER	PICTURE X(8) VALUE	C98970
40070		:	#:.	C98970
40100	01	TITLE-1 SYNC.		C98970
40110	05	FILLER	PICTURE X(50) VALUE	C98970
40120		:0 WUC AIRCRAFT	MEAN VARIANCE	1. C98970
40130	05	FILLER	PICTURE X(50) VALUE	C98970
40140		:MEAN VARIANCE	MEAN MEAN	#: C98970
40200	01	TITLE-2 SYNC.		C98970
40210	05	FILLER	PICTURE X(50) VALUE	C98970
40220		: GROUP SUBSET	MH/UMA MH/UMA	N1. C98970
40230	05	FILLER	PICTURE X(50) VALUE	C98970
40240		:ORM/UMA NORM/UMA	[MH/REP]PE [MH/REP]MPO	#: C98970
40300	01	DATA-UNIT SYNC.		C98970
40310	05	FILLER	PICTURE XX VALUE SPACE.	C98970
40320	05	WUC-OUT	PICTURE X(5).	C98970
40330	05	FILLER	PICTURE XXX VALUE SPACE.	C98970
40340	05	A-C-SUB-SET	PICTURE X(7).	C98970
40350	05	FILLER	PICTURE X(3) VALUE SPACE.	C98970
40360	05	MH-UMA-RPT	PICTURE Z(8).9.	C98970
40370	05	FILLER	PICTURE X(3) VALUE SPACE.	C98970
40380	05	VAR-MH-UMA-RPT	PICTURE Z(8).9.	C98970
40390	05	FILLER	PICTURE X(3) VALUE SPACE.	C98970
40400	05	NORM-UMA-RPT	PICTURE Z(8).9.	C98970
40410	05	FILLER	PICTURE X(3) VALUE SPACE.	C98970
40420	05	VAR-NORM-UMA-RPT	PICTURE Z(8).9.	C98970
40430	05	FILLER	PICTURE X(3) VALUE SPACE.	C98970
40440	05	MH-REP-PE-RPT	PICTURE Z(8).9.	C98970
40450	05	FILLER	PICTURE X(3) VALUE SPACE.	C98970
40460	05	MH-REP-HP-RPT	PICTURE Z(8).9.	C98970
40470	05	FILLER	PICTURE X(5) VALUE	C98970
40480		:	#:.	C98970
50000		PROCEDURE DIVISION.		C98970
50010		OPEN INPUT IN-FILE-1.		C98970
50020		FILL-2.		C98970
50030		FILL-3, OUTPUT OUT-DATA-FILE.		C98970
50050		PERFORM RESET-1.		C98970
50060		PERFORM RESET-2.		C98970
50100		READ-DATA-IN.		C98970
50110		READ IN-FILE-1, AT END GO TO CLOSE-DATA.		C98970
50111		IF ISO IS EQUAL TO 19: GO TO CLOSE-DATA.		C98970
50116		ADD 1 TO NUM-REL-1.		C98970
50120		IF ISO IS EQUAL TO CURISO GO TO TEST-GRP-ID.		C98970
50130		IF CUNISO IS EQUAL TO SPACE		C98970
50140		MOVE ISO TO CUNISO		C98970
50150		GO TO TEST-GRP-ID.		C98970
50160		GO TO NEW-GROUP.		C98970
50200		TEST-GRP-ID.		C98970
50210		IF GRP-ID IS EQUAL TO CURID GO TO TEST-WUC.		C98970
50220		IF CUNID IS EQUAL TO SPACE		C98970
50230		MOVE GRP-ID TO CURID		C98970
50240		GO TO TEST-WUC.		C98970
50250		GO TO NEW-GROUP.		C98970
50300		TEST-WUC.		C98970
50310		IF WUC IS EQUAL TO CURWUC GO TO TEST-ID.		C98970
50320		IF CURWUC IS EQUAL TO SPACE		C98970
50330		MOVE WUC TO CURWUC		C98970
50340		GO TO TEST-ID.		C98970
50350		GO TO NEW-WUC.		C98970
50400		TEST-ID.		C98970
50405		MOVE WUC-IN TO WUC-OUT.		C98970
50410		IF JD IS EQUAL TO ONE MOVE DATA-IN TO DATA-1		C98970
50420		GO TO READ-DATA-IN.		C98970
50430		IF JD IS EQUAL TO TWO MOVE DATA-IN TO DATA-2		C98970
50440		GO TO TEST-HMC.		C98970
50450		IF N2 IS EQUAL TO ZERO GO TO READ-DATA-IN.		C98970
50455		COMPUTE A > C / N2 - MH-UMA.		C98970
50460		COMPUTE VAR-MH-UMA-D > VAR-MH-UMA-D < [N2 * A * A < X1].		C98970
50465		COMPUTE VAR-NORM-UMA-D > VAR-NORM-UMA-D <		C98970
50466		N2 * [VAR-NORM-MA < [NORM-MA - NORM-UMA] *		C98970
50467		[NORM-MA - NORM-UMA]].		C98970
50470		GO TO READ-DATA-IN.		C98970
50500		TEST-HMC.		C98970
50510		IF HMC-1 IS NOT EQUAL TO HMC-2 GO TO READ-DATA-IN.		C98970
50515		IF N2 IS EQUAL TO ZERO GO TO READ-DATA-IN.		C98970
50520		COMPUTE R > MH-MA - C / N2.		C98970
50530		COMPUTE X1 > X1 < NUMA * [VAR-MH-MA < B * B].		C98970
50690		GO TO READ-DATA-IN.		C98970
51000		NEW-WUC.		C98970
51050		PERFORM RESET-1.		C98970
51060		MOVE WUC TO CURWUC.		C98970
51090		GO TO TEST-ID.		C98970
51100		NEW-GROUP.		C98970
51110		COMPUTE VAR-MH-UMA > VAR-MH-UMA-D / N1.		C98970
51120		COMPUTE VAR-NORM-UMA > VAR-NORM-UMA-D / N1.		C98970

51140	IF CURISO IS EQUAL TO ONE MOVE : ISO : TO A-C-SUB-SET	C98970
51150	ELSE MOVE :NON-ISO: TO A-C-SUB-SET.	C98970
51160	MOVE MH-UMA TO MH-UMA-RPT.	C98970
51170	MOVE VAR-MH-UMA TO VAR-MH-UMA-RPT.	C98970
51180	MOVE NORM-UMA TO NORM-UMA-RPT.	C98970
51190	MOVE VAR-NORM-UMA TO VAR-NORM-UMA-RPT.	C98970
51200	MOVE MH-REP-PE TO MH-REP-PE-RPT.	C98970
51210	MOVE MH-REP-HP TO MH-REP-HP-RPT.	C98970
51220	IF PAGE-CNT IS GREATER THAN 60 PERFORM NEW-PAGE.	C98970
51230	WRITE OUT-DATA-REC FROM DATA-OUT.	C98970
51240	ADD 1 TO PAGE-CNT.	C98970
51250	ADD 1 TO LINES-PRINT.	C98970
51255	NEW-GROUP-END.	C98970
51260	PERFORM RESET-1.	C98970
51270	PERFORM RESET-2.	C98970
51370	MOVE WUC TO CURWUC. MOVE GRP-ID TO CURID.	C98970
51380	MOVE ISO TO CURISO.	C98970
51390	GO TO TEST-ID.	C98970
52000	CLOSE-DATA.	C98970
52010	PERFORM NEW-GROUP.	C98970
52100	MOVE NUM-REC-1 TO TEMP-NUM.	C98970
52110	DISPLAY : NO. RECS FILE : TEMP-NUM UPON CONSOLE.	C98970
52120	MOVE NUM-REC-2 TO TEMP-NUM.	C98970
52130	DISPLAY : NO. RECS FILE 2 : TEMP-NUM UPON CONSOLE.	C98970
52140	MOVE NUM-REC-3 TO TEMP-NUM.	C98970
52150	DISPLAY : NO. RECS FILE 3 : TEMP-NUM UPON CONSOLE.	C98970
52160	MOVE LINES-PRINT TO TEMP-NUM.	C98970
52170	DISPLAY : TOTAL LINES PRINTED > : TEMP-NUM UPON CONSOLE.	C98970
52180	MOVE PAGE-NUM TO TEMP-NUM.	C98970
52190	DISPLAY : TOTAL PAGES PRINTED > : TEMP-NUM UPON CONSOLE.	C98970
52200	CLOSE-FILES.	C98970
52220	CLOSE IN-FILE-1.	C98970
52230	FILE-2.	C98970
52235	OUT-DATA-FILE.	C98970
52240	FILE-3 WITH LOCK.	C98970
52250	DISPLAY : EOJ 9897 : UPON CONSOLE.	C98970
52290	GOBACK.	C98970
53000	RESET-1.	C98970
53010	MOVE ZERO TO X1.	C98970
53020	READ FILE-2 INTO WS-REC-2, AT END GO TO CLOSE-DATA.	C98970
53040	IF ISO-2 IS EQUAL TO :9: GO TO CLOSE-DATA.	C98970
53050	ADD 1 TO NUM-REC-2.	C98970
53100	RESET-2.	C98970
53110	MOVE ZERO TO VAR-MH-UMA-D.	C98970
53120	MOVE ZERO TO VAR-NORM-UMA-D.	C98970
53130	READ FILE-3 INTO WS-REC-3, AT END GO TO CLOSE-DATA.	C98970
53150	IF ISO-3 IS EQUAL TO :9: GO TO CLOSE-DATA.	C98970
53160	ADD 1 TO NUM-REC-3.	C98970
55000	NEW-PAGE.	C98970
55010	ADD 1 TO PAGE-NUM.	C98970
55020	MOVE ZERO TO PAGE-CNT.	C98970
55030	MOVE PAGE-NUM TO PAGE-NO-RPT.	C98970
55040	ADD 3 TO LINES-PRINT.	C98970
55050	WRITE OUT-DATA-REC FROM NEW-PAGE-REC.	C98970
55060	WRITE OUT-DATA-REC FROM TITLE-1.	C98970
55070	WRITE OUT-DATA-REC FROM TITLE-2.	C98970
/*	PLACE COBOL SOURCE BEFORE THIS CARD	
//CHG,TFGIN	DD *,SPACE>[CYL,(1,1)]	1440 CDS
/*	PLACE TFG DATA BEFORE THIS CARD	
//TPR,TU12	DD DISP>[OLD,KEEP],VOL>[SER]>+F1,UNIT>T+F1	T12
//TPR,TU25	DD DISP>[OLD,PASS]	D25-PASS
//TPR,TPRIN	DD *,SPACE>[TRK,(1,1)]	
T/P TU25	1998100R000	
/*	PLACE T/P CONTROL CARDS BEFORE THIS CARD	
//C9897P EXEC	C9603N,TIME>02,ACCT>D35323007	
//CHG,TU25	DD DSN>+P.9897467,DISP>[OLD,DELETE]	D25-IN
//CHG,TPRIN	DD *,SPACE>[TRK,(1,1)]	
T/P TU25	1998100R000	
/*	PLACE T/P CONTROL CARDS BEFORE THIS CARD	

APPENDIX III

SOURCE LISTING — EFFECTIVENESS MODEL, NETWORK ANALYSIS MODEL

[illegible]

C READ WUC SET DATA DEPENDENT ON TIME	810
READ(5,103) (ANU(I,K),BNU(I,K),ANAB(I,K),BNAB(I,K),K=1,KSET)	820
10 CONTINUE	830
C READ WUC SET DATA INDEPENDENT OF TIME	840
READ(5,104) (EMHU(K),SMHU(K),ENU(K),SNU(K),ENWK(K),K=1,KSET)	850
C READ SPECIAL INSPECTION DATA	860
READ(5,105) (EMHS(I),SMHS(I),ENS(I),SNS(I),DISP(I),SISP(I),KIS(I),	870
I=1,NSPT)	880
WRITE(6,300) HEAD	890
WRITE(6,301) EFHW,SFW	900
WRITE(6,302) ESOW,SSOW	910
WRITE(6,303) ELDW,SLOW	920
WRITE(6,304) EMHP,SMHP	930
WRITE(6,305) EMHB,SMHB	940
WRITE(6,306) R	950
WRITE(6,307) AIES	960
WRITE(6,308)	970
DO 15 I=1,NSCT	980
NENFOL(I)	990
WRITE(6,309) (I,J, EMHI(I,J),SMHI(I,J),AN(I,J),BN(I,J),SNI(I,J),	1000
INSCH(I,J),J=1,N)	1010
15 CONTINUE	1020
WRITE(6,310)	1030
WRITE(6,311) ((I,K ,ANU(I,K),BNU(I,K),ANAB(I,K),BNAB(I,K),K=1,KSET	1040
I),I=1,NSCT)	1050
WRITE(6,312)	1060
WRITE(6,313) (K,EMHU(K),SMHU(K),ENU(K),SNU(K),ENWK(K),K=1,KSET)	1070
WRITE(6,314)	1080
WRITE(6,315) (J,EMHS(J),SMHS(J),ENS(J),SNS(J),DISP(J),SISP(J),	1090
I KIS(J),J=1,NSPT)	1100
WRITE(6,400)	1110
C PERFORM CALCULATIONS	1120
DO 10 IINT=1,NI	1130
CALL PFPF	1140
CALL SPIS	1150
CALL INVL	1160
CALL MPD	1170
C PRINT INTERVAL RESULTS	1180
WRITE(6,401) DELI(IINT)	1190
WRITE(6,402)	1200
WRITE(6,403) EWKD,SWKD	1210
WRITE(6,404) EPH,SPFH	1220
WRITE(6,405) EPH,SHPH	1230
WRITE(6,406) EMSD,SMSD	1240
WRITE(6,407) ENSD,SNSD	1250
WRITE(6,413)	1260
WRITE(6,414) (I,UMAC(I),I=1,NSCT)	1270
WRITE(6,415)	1280
WRITE(6,417) (I,EACM(I),SACM(I),I=1,NSCT)	1290
WRITE(6,416)	1300
WRITE(6,417) (I,EACN(I),SACN(I),I=1,NSCT)	1310
WRITE(6,408)	1320
DO 516 I=1,NSCT	1330
NENFOL(I)	1340
DO 515 J=1,N	1350
WRITE(6,409) I,J,EMHU(I,J),SMHD(I,J)	1360
515 CONTINUE	1370
516 CONTINUE	1380
WRITE(6,410)	1390
DO 518 I=1,NSCT	1400
NENFOL(I)	1410
DO 517 J=1,N	1420
WRITE(6,409) I,J,END(I,J),SND(I,J)	1430
517 CONTINUE	1440
518 CONTINUE	1450
WRITE(6,411)	1460
DO 520 I=1,NSCT	1470
NENFOL(I)	1480
DO 519 J=1,N	1490
WRITE(6,412) I,J,EED(I,J),SED(I,J)	1500
519 CONTINUE	1510
520 CONTINUE	1520
WRITE(6,418)	1530
WRITE(6,419) (I,DD(I),I=1,NSCT)	1540
16 CONTINUE	1550
C PRINT MAINTENANCE PROGRAM RESULTS	1560
WRITE(6,200)	1570
WRITE(6,201)	1580
IF(K1-2) 20,30,40	1590
20 WRITE(6,202)	1600
GO TO 70	1610
30 WRITE(6,203)	1620
GO TO 70	1630
40 IF(K1-4) 50,60,2	1640
50 WRITE(6,204)	1650
GO TO 70	1660
	1670

[illegible]

C	DATA GENERATED BY SPIB	2540
	7EMSD,SMSD,ENDSD,SNSD,	2550
C	DATA GENERATED BY INVL	2560
	8EMHD(3,3),SPHD(3,3),END(3,3),SND(3,3),EED(3,3),SLD(3,3),DD(3,3),	2570
	BUMAC(3),LAC(3),SACH(3),EACN(3),SACN(3),ACNS,	2580
C	DATA GENERATED BY MPD	2590
	9EMHY(10),SMHT(10),ENHR(10),SNHR(10),EEMP(10),SEMP(10),DMP(10)	2600
	10 DIMENSION SOD(20),PSOD(20)	2610
	IF(K1-2) 100,200,10	2620
	10 IF(K1-4) 300,400,1000	2630
C	INTERVAL IS IN WEEKS	2640
100	ESOU=DELI(IINT)*ESOW	2650
	SSOU=DELI(IINT)*SSOW	2660
	EWKU=DELI(IINT)	2670
	SWKU=0.0	2680
	DO 110 I=1,40	2690
	WKU(I)=I	2700
	IF(WKU(I)-EWKU) 104,106,106	2710
104	PWKU(I)=0.0	2720
	GO TO 110	2730
106	PWKU(I)=1.0	2740
110	CONTINUE	2750
	GO TO 600	2760
C	INTERVAL IS IN FLIGHT HOURS	2770
200	IF(SFHW) 220,220,201	2780
201	DO 210 I=1,40	2790
	WKU(I)=I	2800
	A=DELI(IINT)/I	2810
	CALL NML(A,EFHW,SFHW,P)	2820
	PWKU(I)=1.-P	2830
210	CONTINUE	2840
	GO TO 500	2850
220	PWKU(I)=-101.	2860
	EWKU=DELI(IINT)/EFHW	2870
	SWKU=0.0	2880
	GO TO 475	2890
C	INTERVAL IS IN SORTIES	2900
300	IF(SSOW) 320,320,301	2910
301	ESOU=DELI(IINT)	2920
	SSOU=0.0	2930
	DO 310 I=1,40	2940
	WKU(I)=I	2950
	A=DELI(IINT)/I	2960
	CALL NML(A,ESOW,SSOW,P)	2970
	PWKU(I)=1.-P	2980
310	CONTINUE	2990
	GO TO 550	3000
320	EWKU=DELI(IINT)/ESOW	3010
	SWKU=0.0	3020
	PWKU(I)=-101.	3030
	GO TO 600	3040
C	INTERVAL IS IN LANDINGS	3050
400	IF(SLDW) 420,420,401	3060
401	DO 410 I=1,40	3070
	WKU(I)=I	3080
	A=DELI(IINT)/I	3090
	CALL NML(A,ELDW,SLDW,P)	3100
	PWKU(I)=1.-P	3110
410	CONTINUE	3120
	GO TO 500	3130
420	EWKU=DELI(IINT)/ELDW	3140
	SWKU=0.0	3150
	PWKU(I)=-101.	3160
475	IF(SSOW) 480,480,490	3170
480	ESOU=ESOW*EWKU	3180
	SSOU=0.0	3190
	GO TO 600	3200
490	DO 494 I=1,20	3210
	SOU(I)=4.0*I	3220
	A=SOU(I)/EWKU	3230
	CALL NML(A,ESOW,SSOW,P)	3240
	PSOU(I)=P	3250
494	CONTINUE	3260
	GO TO 555	3270
500	IF(SSOW) 530,530,511	3280
511	DO 510 I=1,20	3290
	SOU(I)=4.0*I	3300
	PSOU(I)=0.0	3310
	DO 509 J=1,40	3320
	A=SOU(I)/WKU(J)	3330
	IF(J-1) 501,501,502	3340
501	UP=PWKU(I)	3350
	GO TO 503	3360
502	UP=PWKU(J)-PWKU(J-1)	3370
503	CALL NML(A,ESOW,SSOW,P)	3380
	PSOU(I)=PSOU(I)+P*OP	3390

509	CONTINUE	3400
510	CONTINUE	3410
	GO TO 550	3420
530	DO 540 I=1,20	3430
	PSOU(I)=0.0	3440
	SOD(I)=4.0*I	3450
	DO 539 J=1,40	3460
	A=SOU(I)/WKD(J)	3470
	IF(A=ESOU) 539,532,532	3480
532	IF(J=1) 533,533,534	3490
533	UP=PWKD(J)	3500
	GO TO 535	3510
534	DP=PWKD(J)-PWKD(J-1)	3520
535	PSOU(I)=PSOU(I)+DP	3530
539	CONTINUE	3540
	GO TO 540	3550
540	CONTINUE	3560
550	NW=40	3565
	CALL MNDV(WKD,PWKD,NW,EWKD,SWKD)	3570
555	NS=20	3575
	CALL MNDV(SOU,PSOU,NS,ESOU,SSOU)	3580
600	EBPD=ESOU	3590
	SBPD=SSOU	3600
	EPFD=EBPD	3610
	SPFD=SBPD	3620
	NINT=0.0	3630
	DO 610 I=1,INISCT	3640
	NM=NFOL(I)	3650
	DO 609 J=1,INM	3660
	NINT=NINT+NSCH(I,J)	3670
609	CONTINUE	3680
610	CONTINUE	3690
C	CALCULATE WEEKS IN MAINTENANCE PROGRAM PERIOD	3700
	EWKM=NINT*EWKD	3710
	SWKM=SQRT(NINT*SWKD*SWKD)	3720
C	CALCULATE PREFLIGHT AND BASIC POSTFLIGHT MANHOURS IN INTERVAL	3730
	EPFH=EMHP*EPFD	3740
	SPFH=SQRT(SMHP*SMHP*EPFD+SPFD*SPFD*EMHP*EMHP)	3750
	EBPH=EMHB*EBPD	3760
	SBPH=SQRT(SMHB*SMHB*EBPD+SBPD*SBPD*EMHB*EMHB)	3770
	RETURN	3780
C	C C	3790
C	THE VARIABLES TO BE USED IN OTHER ROUTINES ARE	3800
C	WKD(I),PWKD(I) DISTRIBUTION OF WEEKS PER INTERVAL	3810
C	EWKD,SWKM MEAN AND STD DEV OF WEEKS PER INTERVAL	3820
C	EWKM,SWKM MEAN AND STD DEV OF WEEKS PER MP	3830
C	EPFH,SPFH MEAN AND STD DEV OF PREFLIGHT MANHOURS IN INTERVAL	3840
C	EBPH,SBPH MEAN AND STD DEV OF BASIC POSTFLIGHT MANHOURS IN	3850
C	INTERVAL	3860
C	NINT NUMBER OF MAJOR INSPECTION INTERVALS	3870
C	C C	3880
1000	STOP	3890
	END	3900
	SUBROUTINE SPIS	3910
	COMMON IINT,	3920
C	INPUT DATA	3930
	1UEL(10),KI,NSCT,NFOL(3),NSCH(3,3),NSPT,DISP(60),SISP(60),KIS(60),	3940
	2H,EMHI(3,3),SMHI(3,3),AN(3,3),BN(3,3),SNI(3,3),EMHS(60),SMHS(60),	3950
	3LNS(60),SNS(60),EMHP,SMHP,EMHB,SMHB,NI,KSET,ANU(3,60),BNU(3,60),	3960
	4EMHU(60),SMHU(60),ENU(60),SHU(60),ANAB(3,60),BNAB(3,60),ENWK(60),	3970
	5EFHW,SFHW,ESOU,SSOU,ELDU,SLDU,AIES,	3980
C	DATA GENERATED BY PFF	3990
	6WKD(40),PWKD(40),EWKD,SWKD,EWKM,SWKM,EPFH,SPFH,EBPH,SBPH,NINT,	4000
C	DATA GENERATED BY SPIS	4010
	7EMSU,SMU,ENSU,SNIS,	4020
C	DATA GENERATED BY INVL	4030
	8EMHU(3,3),SMHU(3,3),END(3,3),SND(3,3),EED(3,3),SED(3,3),DD(3),	4040
	9UMAC(3),EACN(3),SACN(3),EACN(3),SACN(3),ACNS,	4050
C	DATA GENERATED BY MPD	4060
	9EMHY(10),SMHY(10),ENHR(10),SNHR(10),EEMP(10),SEMP(10),UMP(10)	4070
	10EMHS(10),SMHS(10),ENHS(10),SNHS(10),EEMP(10),SEMP(10),UMP(10)	4080
	11SPN(20),PSPN(20),TMHS(150),PMHS(150),TNS(150),PNS(150)	4090
	EMSU=0.0	4100
	SMU=0.0	4110
	ENSU=0.0	4120
	SNIS=0.0	4130
	DO 100 I=1,NSPT	4140
	IF(KIS(I)=2) 10,20,1000	4150
C	1TH INTERVAL IN WEEKS	4160
	10 EWKM=DISP(I)	4170
	SWKM=SISP(I)	4180
	GO TO 50	4190
C	1TH INTERVAL IN FLIGHT HOURS	4200
	20 IF(SFHW) 400,400,21	4210
	21 IF(SISP(I)) 42,42,25	4220

25	UO 40 J=1,150	4230
	DISW(J)=J	4240
	PISW(J)=0.0	4250
	SI=SI*P(I)	4260
	UF=SI*0.10	4270
	UO 38 K=1,61	4280
	F=DISP(I)+UF*(K-31)	4290
	FD=F-DISP(I)	4300
	POW=FD*FD/(2.*SI*SI)	4310
	IF(POW=700.) 34,38,38	4320
34	UN=0.39894/(SI*EXP(POW))	4330
	FC=F/DISW(J)	4340
	CALL NML(FC,EFHW,SFW,P)	4350
	PISW(J)=PISW(J)+(1.-P)*DN*DF	4360
38	CONTINUE	4370
40	CONTINUE	4380
	GO TO 45	4390
42	UO 44 J=1,150	4400
	DISW(J)=J	4410
	FC=DISP(I)/DISW(J)	4420
	CALL NML(FC,EFHW,SFW,P)	4430
	PISW(J)=1.-P	4440
44	CONTINUE	4450
	GO TO 45	4460
400	IF(SISP(I)) 410,410,415	4470
410	EIWK=DISP(I)/EFHW	4480
	SIWK=0.0	4490
	GO TO 50	4500
415	UO 440 J=1,150	4510
	DISW(J)=J	4520
	PISW(J)=0.0	4530
	SI=SI*P(I)	4540
	UF=SI*0.1	4550
	UO 438 K=1,61	4560
	F=DISP(I)+UF*(K-31)	4570
	FD=F-DISP(I)	4580
	POW=FD*FD/(2.*SI*SI)	4590
	IF(POW=700.) 432,438,438	4600
432	UN=0.39894/(SI*EXP(POW))	4610
	FC=F/DISW(J)	4620
	IF(FC=EFHW) 434,438,438	4630
434	PISW(J)=PISW(J)+DN*DF	4640
438	CONTINUE	4650
440	CONTINUE	4660
45	NA=150	4670
	CALL MNDV(DISW,PISW,NA,EIWK,SIWK)	4680
C	CALCULATE NUMBER OF SPECIAL INSPECTIONS PER INTERVAL	4690
C	PNSP(K) IS THE PROBABILITY THAT THE NUMBER OF INSPECTIONS IS	4700
C	.LE. (K-1)	4710
50	DIMN=EIWK-3.0*SIWK	4720
	IF(DIMN<0.1) 51,52,52	4730
51	DIMN=.001*EIWK	4740
52	NMX=(EIWK+3.*SIWK)/DIMN	4750
	IF(NMX) 100,100,601	4760
601	IF(NMX-99) 54,54,53	4770
53	NMX=99	4780
54	IF(SIWK) 200,200,55	4790
55	UO 61 J=1,NMX	4800
	PP=0.0	4810
	E=J*EIWK	4820
	E1=(J+1)*EIWK	4830
	S=SQRT(FLCAT(J))*SIWK	4840
	S1=SQRT(FLCAT(J+1))*SIWK	4850
	IF(PWKD(1)+10.) 155,56,56	4860
155	CALL NML(EWKU,E,S,P)	4870
	CALL NML(EWKU,E1,S1,P1)	4880
	PP=PP+(P-P1)	4890
	GO TO 160	4900
56	UO 68 K=1,40	4910
	C=WKU(K)	4920
	CALL NML(C,E,S,P)	4930
	CALL NML(C,E1,S1,P1)	4940
	IF(K=2) 58,59,59	4950
58	PP=PP+(P-P1)*PWKD(1)	4960
	GO TO 60	4970
59	PP=PP+(P-P1)*(PWKD(K)-PWKD(K-1))	4980
60	CONTINUE	4990
160	PNSP(J+1)=PP	5000
61	CONTINUE	5010
	IF(PWKD(1)+10.) 170,165,165	5020
165	PP=0.0	5030
	UO 65 K=1,40	5040
	C=WKU(K)	5050
	CALL NML(C,EIWK,SIWK,P)	5060
	IF(K=2) 62,63,63	5070
62	PP=PP+(1.-P)*PWKD(1)	5080
	GO TO 65	5090

63	PP=PP+(1.-P)*(PWKD(K)-PWKD(K-1))	5100
65	CONTINUE	5110
	PNSP(1)=PP	5120
	GO TO 300	5130
170	CALL NML(EWKU,EIWK,SIWK,P)	5140
	PNSP(1)=1.-P	5150
	GO TO 300	5160
200	IF(PWKD(1)+10.) 210,220,220	5170
210	NNN=EWKD/EIWK	5180
	PNSP(1)=-101.	5190
	GO TO 300	5200
220	NMX=WKD(40)/LIWK	5210
	IF(NMX-100) 222,222,221	5220
221	NMX=100	5230
222	DO 250 J=1,NMX	5240
	DO 240 K=1,40	5250
	C=WKU(K)	5260
	IF(C-(J-1)*EIWK) 240,230,230	5270
230	IF(C-J*EIWK) 235,240,240	5280
235	IF(K-2) 236,237,237	5290
236	PNSP(J+1)=PWKD(1)+PNSP(J+1)	5300
	GO TO 240	5310
237	PNSP(J+1)=PNSP(J+1)+PWKD(K)-PWKD(K-1)	5320
240	CONTINUE	5330
250	CONTINUE	5340
	PNSP(1)=0.0	5350
	DO 260 K=1,40	5360
	C=WKU(K)	5370
	IF(C-EIWK) 255,260,260	5380
255	IF(K-2) 256,257,257	5390
256	PNSP(1)=PNSP(1)+PWKD(1)	5400
	GO TO 260	5410
257	PNSP(1)=PNSP(1)+PWKD(K)-PWKD(K-1)	5420
260	CONTINUE	5430
300	IF(PNSP(1)+10.) 308,308,301	5440
301	NN=NMX+2	5450
	NN=NMX	5460
	DO 304 K=1,NN	5470
	J=NN-K	5480
	IF(PNSP(J)) 302,302,308	5490
302	NMX=NMX-1	5500
304	CONTINUE	5510
C	CALCULATE SPECIAL INSPECTION MANHOURS AND NORM PER INTERVAL	5520
C	CALCULATE MAXIMUM VALUES	5530
308	HMX=NMX*(EMHS(1)+3.*SMHS(1))	5540
	UTMX=NMX*(ENS(1)+3.*SNS(1))	5550
	IF(SMHS(1)) 340,340,310	5560
310	IF(PNSP(1)+10.) 314,312,312	5570
312	DO 80 J=1,150	5580
	PP=PNSP(1)	5590
	TMHS(J)=(J-1)*HMX/149.	5600
	NN=NMX+1	5610
	DO 70 K=2,NN	5620
	EM=(K-1)*EMHS(1)	5630
	SM=SQRT(FLOAT(K-1))*SMHS(1)	5640
	CALL NML(TMHS(J),EM,SM,P)	5650
	PP=PP+P*PNSP(K)	5660
70	CONTINUE	5670
	PMHS(J)=PP	5680
80	CONTINUE	5690
	GO TO 360	5700
314	DO 328 J=1,150	5710
	TMHS(J)=(J-1)*HMX/149.	5720
	IF(NNN) 320,320,318	5730
318	EM=NNN*EMHS(1)	5740
	SM=SQRT(FLOAT(NNN))*SMHS(1)	5750
	CALL NML(TMHS(J),EM,SM,PMHS(J))	5760
	GO TO 328	5770
320	PMHS(J)=1.0	5780
328	CONTINUE	5790
	GO TO 360	5800
340	IF(PNSP(1)+10.) 350,350,342	5810
342	DO 348 J=1,150	5820
	TMHS(J)=(J-1)*HMX/149.	5830
	PP=0.0	5840
	NN=NMX+1	5850
	DO 347 K=1,NN	5860
	IF(TMHS(J)-(K-1)*EMHS(1)) 347,346,346	5870
346	PP=PP+PNSP(K)	5880
347	CONTINUE	5890
	PMHS(J)=PP	5900
348	CONTINUE	5910
	GO TO 360	5920
350	DO 358 J=1,150	5930
	TMHS(J)=(J-1)*HMX/149.	5940
	IF(TMHS(J)-NNN*EMHS(1)) 354,356,356	5950

354	PMHS(J)=0.0	5960
GO	TO 358	5970
356	PMHS(J)=1.0	5980
358	CONTINUE	5990
360	IF(SNS(I)) 384,384,382	6000
362	IF(PNSP(1)+10.) 381,381,384	6010
364	DO 380 J=1,100	6020
	TNS(J)=(J-1)*DTMX/149.	6030
	PNS=PNSP(1)	6040
	NN=NNX+1	6050
	DO 378 K=2,NN	6060
	EN=(K-1)*ENS(I)	6070
	SN=SQRT(FLOAT(K-1))*SNS(I)	6080
72	CALL NML(TNS(J),EN,SN,P)	6090
76	PNS=PN+P*PNSP(K)	6100
378	CONTINUE	6110
	PNS(J)=PNS	6120
380	CONTINUE	6130
GO	TO 500	6140
381	DO 383 J=1,100	6150
	TNS(J)=(J-1)*DTMX/149.	6160
	IF(NNN) 600,600,382	6170
382	EN=NNN*ENS(I)	6180
	SN=SQRT(FLOAT(NNN))*SNS(I)	6190
	CALL NML(TNS(J),EN,SN,PNS(J))	6200
GO	TO 383	6210
600	PNS(J)=1.0	6220
383	CONTINUE	6230
GO	TO 500	6240
384	IF(PNSP(1)+10.) 393,393,385	6250
385	DO 392 J=1,100	6260
	TNS(J)=(J-1)*DTMX/149.	6270
	PP=0.0	6280
	NN=NNX+1	6290
	DO 389 K=1,NN	6300
	IF(TNS(J)-(K-1)*ENS(I)) 389,386,386	6310
386	PP=PP+PNSP(K)	6320
389	CONTINUE	6330
	PNS(J)=PP	6340
392	CONTINUE	6350
GO	TO 500	6360
393	DO 398 J=1,100	6370
	TNS(J)=(J-1)*DTMX/149.	6380
	IF(TNS(J)-NNN*ENS(I)) 395,396,396	6390
395	PNS(J)=0.0	6400
GO	TO 398	6410
396	PNS(J)=1.0	6420
398	CONTINUE	6430
500	NA=150	6440
	CALL MNDV(TMHS,PMHS,NA,BARN,SDM)	6450
	EMSD=EMSD+BARN	6460
	SMSD=SMSD+SDM*SDM	6470
	CALL MNDV(TNS,PNS,NA,BARN,SDN)	6480
	ENSU=ENSU+BARN	6490
	SNSU=SNSU+SDN*SDN	6500
100	CONTINUE	6510
	SMSD=SQRT(SMSD)	6520
	SNSU=SQRT(SNSU)	6530
	RETURN	6540
C	C C	6550
C	THE VARIABLES TO BE USED IN OTHER ROUTINES ARE	6560
C	EMSD,SMSD MEAN AND STD DEV FOR SPECIAL INSPECTION MANHOURS PER	6570
C	INTERVAL	6580
C	ENSU,SNSU MEAN AND STD DEV FOR SPECIAL INSPECTION NORM PER	6590
C	INTERVAL	6600
C	C C	6610
1000	STOP	6620
	END	6630
	SUBROUTINE INVL	6640
C	THIS ROUTINE DETERMINES MANHOURS, NORM, NOR, AVAILABILITY, AND	6650
C	EFFECTIVENESS FOR EACH INTERVAL	6660
	COMMON INT,	6670
C	INPUT DATA	6680
	IDELI(10),KI,KSET,NFOL(3),NSCH(3,3),NSPT,DISP(60),SISP(60),KIS(60),	6690
	2K,EMHI(3,3),SMHI(3,3),AN(3,3),BN(3,3),SNI(3,3),EMHS(60),SMHS(60),	6700
	3ENS(60),SNS(60),EMHP,SMHP,EMHB,SMHB,NI,KSET,ANU(3,60),BNU(3,60),	6710
	4EMHU(60),SMHU(60),ENU(60),SNU(60),ANAB(3,60),BNAB(3,60),ENWK(60),	6720
	5LFHW,SPFH,ESOW,SSOW,ELDW,SLDW,AIES,	6730
C	DATA GENERATED BY PPF	6740
	6WKD(40),PWKD(40),EWKD,SWKD,ENKM,SWKM,EPFH,SPFH,ESPH,SBPH,NINT,	6750
C	DATA GENERATED BY SPIS	6760
	7EMSD,SMSD,ENSU,SNSU,	6770
C	DATA GENERATED BY INVL	6780
	8EMHU(3,3),SMHU(3,3),END(3,3),SND(3,3),EED(3,3),SED(3,3),OD(3),	6790
	9UMAC(3),EACM(3),SACM(3),EACN(3),SACN(3),ACNS,	6800

C	DATA GENERATED BY MPD	6810
	9EMHI(10),SMHI(10),ENHR(10),SNHR(10),CEMP(10),SEMP(10),DMP(10)	6820
	DOUBLE PRECISION TAV,DTAV,DT,DTG	6825
	DIMENSION TAV(20),PAV(20),TNR(61),PNR(61)	6830
C	CALCULATE AIRCRAFT HOURS PER WEEK	6840
	ACNS=0.0	6850
	DO 10 K=1,KSET	6860
	ACNS=ACNS+ENH(K)	6870
10	CONTINUE	6880
	DO 900 I=1,NSCT	6890
	EACM(I)=0.0	6900
	SACM(I)=0.0	6910
	EACN(I)=0.0	6920
	SACN(I)=0.0	6930
	UMAC(I)=0.0	6940
C	CALCULATE UNSCHEDULED MANHOURS AND NORM PER INTERVAL	6950
	DO 20 K=1,KSET	6960
	UMA=UEL(IINT)*(ANU(I,K)+BNU(I,K)+DELI(IINT))	6970
	IF(UMA) 12,13,13	6980
12	UMA=0.0	6990
13	EMH=EMHU(K)+UMA	7000
	SMH=SQRT(UMA*(SMHU(K)+SMHU(K)+EMHU(K)+EMHU(K)))	7010
	EN=ENU(K)+UMA	7020
	SN=SQRT(UMA*(SNU(K)+SNU(K)+ENU(K)+ENU(K)))	7030
	EACM(I)=EACM(I)+EMH	7040
	SACM(I)=SACM(I)+SMH	7050
	EACN(I)=EACN(I)+EN	7060
	SACN(I)=SACN(I)+SN	7070
	UMAC(I)=UMA+UMAC(I)	7080
20	CONTINUE	7090
	SACM(I)=SQRT(SACM(I))	7100
	SACN(I)=SQRT(SACN(I))	7110
	ABN=0.0	7120
C	CALCULATE DEPENDABILITY PER INTERVAL	7130
	DO 30 K=1,KSET	7140
	A=ANAB(I,K)	7150
	IF(A) 22,22,23	7160
22	ABN=ABN+0.5*ANAB(I,K)+DELI(IINT)	7170
	GO TO 30	7180
23	AB2=A+ANAB(I,K)+DELI(IINT)	7190
	IF(AB2) 24,24,26	7200
24	ABN=ABN+A+0.5	7210
	GO TO 30	7220
26	ABN=ABN+A+0.5*ANAB(I,K)+DELI(IINT)	7230
30	CONTINUE	7240
	FS=AIES+ABN	7250
	UD(I)=EXP(-FS)	7260
C	CALCULATE TOTAL MANHOURS AND NORM PER INTERVAL	7270
	NM=NFOL(I)	7280
	DO 800 J=1,NM	7290
	EMHU(I,J)=EMHI(I,J)+EPFH+EBPH+EACM(I)+ENSD	7300
	SMHI(I,J)=SQRT(SMHI(I,J)+SMHI(I,J)+SPFH+SPFH+SBPH+SBPH+SACM(I)+	7310
	SACM(I)+SMSD+SMSD)	7320
	ENI=EN(I,J)+UN(I,J)+DELI(IINT)	7330
	IF(ENI) 28,29,29	7340
28	ENI=0.0	7350
29	ENM=ENI+EACM(I)+ENSD	7360
	SNM2=SMI(I,J)+SMI(I,J)+SACN(I)+SACN(I)+SNSD+SNSD	7370
	END(I,J)=ENM+ACNS*(EWKD+ENI/168.)	7380
	S2=SNM2+ACNS+ACNS*(SWKD+SMI(I,J)+SMI(I,J)/2022.)	7390
	SND(I,J)=SQRT(S2)	7400
C	GENERATE NORM PER INTERVAL DISTRIBUTION	7410
	E=ENU(I,J)	7420
	S=SNU(I,J)	7430
	IF(S) 400,400,100	7440
100	TNR(I)=E-3.0+S	7450
	DS=0.1+S	7460
	DO 102 L=2,61	7470
	TNR(L)=TNR(L-1)+DS	7480
102	CONTINUE	7490
	IF(TNR(I)) 310,302,302	7500
302	DO 304 L=1,61	7510
	CALL NML(TNR(L),E,S,PNR(L))	7520
304	CONTINUE	7530
	GO TO 164	7540
310	DO 320 L=2,61	7550
	IF(TNR(L)) 320,325,340	7560
320	CONTINUE	7570
325	NNK=62-L	7580
	NN1=L-1	7590
	DO 328 L=1,NNR	7600
	TNR(L)=TNR(NN1+L)	7610
	CALL NML(TNR(L),E,S,PNR(L))	7620
328	CONTINUE	7630
	GO TO 164	7640
340	TNR(I)=0.0	7650
	CALL NML(TNR(I),E,S,PNR(I))	7660
	NNK=63-L	7670
	NN1=L-2	7680

III-10

9	EMHY(10),SMHY(10),ENHR(10),SNHR(10),EEMP(10),SEMP(10),OMP(10)	8540
	DIMENSION T(20),P(20)	8550
	A=0.0	8560
	EMHM=0.0	8570
	SMHM=0.0	8580
	ENMP=0.0	8590
	SNMP=0.0	8600
	U =0.0	8610
	EE =0.0	8620
	SE =0.0	8630
	SUM1=0.0	8640
	SUM2=0.0	8650
	DO 10 I=1,NSCT	8660
	NM=NFOL(I)	8670
	DO 9 J=1,NM	8680
	NN=NSCH(I,J)	8690
	EMHM=EMHM+EMD(I,J)*NN	8700
	SMHM=SMHM+SMHD(I,J)*SMHD(I,J)*NN*NN	8710
	SNMP=SNMP+SND(I,J)*SND(I,J)*NN*NN	8720
	ENMP=ENMP+ENU(I,J)*NN	8730
	EE =EE +EEU(I,J)*NN	8740
	SE =SE +SEU(I,J)*SED(I,J)*NN*NN	8750
	U=U+UD(I)*NN	8760
	ENI=AN(I,J)+BN(I,J)*UELI(IINT)	8770
	IF(ENI) 0,0,0	8780
6	ENI=0.0	8790
8	SUM1=SUM1+NSCH(I,J)*ENI*(1.+ACNS/168.)	8800
	SUM2=SUM2+NSCH(I,J)*NSCH(I,J)*SNI(I,J)*SNI(I,J)*(1.+ACNS*ACNS/	8810
	128224.)	8820
9	CONTINUE	8830
10	CONTINUE	8840
	SMHM=SQRT(SMHM)	8850
	SNMP=SQRT(SNMP)	8860
	SEMP(IINT)=SQRT(SE/(NINT*NINT))	8870
	EEMP(IINT)=EE/NINT	8880
	UMP(IINT)=U/NINT	8890
C	CALCULATE MANHOOURS PER YEAR	8900
	DO 20 I=1,20	8910
	T(I)=I*1000.	8920
	E=EMHM-T(I)*(EWKM/52.+SUM1/8736.)	8930
	S=SMHM+SMHM+T(I)*T(I)*(SWKM+SWKM/2700.+SUM2/76317696.)	8940
	S=SQRT(S)	8950
	IF(S) 13,13,12	8960
12	CALL NML(A,E,S,PI)	8970
	P(I)=PI	8980
	GO TO 20	8990
13	IF(T(I)-E) 15,16,16	9000
15	P(I)=0.0	9010
	GO TO 20	9020
16	P(I)=1.0	9030
20	CONTINUE	9040
	CALL MNDV(I,P,20,EMH,SMH)	9050
	EMHY(IINT)=EMH	9060
	SMHY(IINT)=SMH	9070
C	CALCULATE NORMAL HOURS PER HOUR	9080
	DO 30 I=1,20	9090
	T(I)=I*0.05	9100
	E=ENMP-T(I)*(168.+EWKM+SUM1)	9110
	S=SNMP+SNMP+T(I)*T(I)*(28224.+SWKM+SWKM+SUM2)	9120
	S=SQRT(S)	9130
	IF(S) 23,23,22	9140
22	CALL NML(A,E,S,PI)	9150
	P(I)=PI	9160
	GO TO 30	9170
23	IF(T(I)-E) 25,26,26	9180
25	P(I)=0.0	9190
	GO TO 30	9200
26	P(I)=1.0	9210
30	CONTINUE	9220
	CALL MNDV(I,P,20,EN,SN)	9230
	ENHR(IINT)=EN	9240
	SNHR(IINT)=SN	9250
	RETURN	9260
	END	9270
	SUBROUTINE NML(A,E,SU,P)	9280
	DIMENSION X(61),FX(61)	9290
C	STONE CUMULATIVE NORMAL DISTRIBUTION	9300
1	X(1)=-3.0	9310
	DO 10 I=2,61	9320
	X(I)=X(I-1)+0.1	9330
10	CONTINUE	9340
	FX(1)=0.5	9350
	FX(32)=0.5398	9360
	FX(33)=0.5793	9370
	FX(34)=0.6179	9380
	FX(35)=0.6554	9390

FX(30)=0.6915	9400
FX(37)=0.7257	9410
FX(38)=0.7580	9420
FX(39)=0.7881	9430
FX(40)=0.8159	9440
FX(41)=0.8413	9450
FX(42)=0.8643	9460
FX(43)=0.8849	9470
FX(44)=0.9032	9480
FX(45)=0.9192	9490
FX(46)=0.9332	9500
FX(47)=0.9452	9510
FX(48)=0.9554	9520
FX(49)=0.9641	9530
FX(50)=0.9713	9540
FX(51)=0.9772	9550
FX(52)=0.9821	9560
FX(53)=0.9861	9570
FX(54)=0.9893	9580
FX(55)=0.9918	9590
FX(56)=0.9938	9600
FX(57)=0.9953	9610
FX(58)=0.9965	9620
FX(59)=0.9974	9630
FX(60)=0.9981	9640
FX(61)=0.9987	9650
DO 20 I=1,30	9660
FX(I)=1.0-FX(62-I)	9670
20 CONTINUE	9680
C COMPUTE NORMAL(A,E,SD)	9690
I=(A-E)/SD	9700
IF(T-X(I)) 30,40,50	9710
30 P=0.0	9720
RETURN	9730
40 P=FX(I)	9740
RETURN	9750
50 DO 50 I=2,61	9760
IF(T-X(I)) 52,54,56	9770
52 P=FX(I-1)+(FX(I)-FX(I-1))*(T-X(I-1))/(X(I)-X(I-1))	9780
RETURN	9790
54 P=FX(I)	9800
RETURN	9810
56 CONTINUE	9820
P=1.0	9830
RETURN	9840
END	9850
SUBROUTINE MNDEV(T,P,N,BART,SDEV)	9860
C THIS ROUTINE CALCULATES THE MEAN AND STANDARD DEVIATION OF T	9870
DIMENSION T(20),P(20)	9880
BART=T(1)*P(1)	9890
DO 10 I=2,N	9900
BART=BART+T(I)*(P(I)-P(I-1))	9910
10 CONTINUE	9920
SDEV=P(1)*(T(1)-BART)**2	9930
DO 20 I=2,N	9940
SDEV=SDEV+(P(I)-P(I-1))*(T(I)-BART)**2	9950
20 CONTINUE	9960
IF(ABS(SDEV-.5E-10)) 30,30,40	9970
30 SDEV=0.0	9980
RETURN	9990
40 SDEV=SQRT(SDEV)	10000
RETURN	10010
END	10020
SUBROUTINE DMDEV(T,P,N,BART,SDEV)	10060
C THIS ROUTINE CALCULATES THE MEAN AND STANDARD DEVIATION OF T	10070
DOUBLE PRECISION T	10075
DIMENSION T(20),P(20)	10080
BART=T(1)*P(1)	10090
DO 10 I=2,N	10100
BART=BART+T(I)*(P(I)-P(I-1))	10110
10 CONTINUE	10120
SDEV=P(1)*(T(1)-BART)**2	10130
DO 20 I=2,N	10140
SDEV=SDEV+(P(I)-P(I-1))*(T(I)-BART)**2	10150
20 CONTINUE	10160
IF(ABS(SDEV-.5E-10)) 30,30,40	10170
30 SDEV=0.0	10180
RETURN	10190
40 SDEV=SQRT(SDEV)	10200
RETURN	10210
END	10220
/* REQUIRED PLACE FORTRAN BCD SOURCE BEFORE THIS CARD	
//LKED.SYSPRINT DD SPACE>[CYL,(1,1)]	
//LKED.SYSIN DD DATA,SPACE>[TRK,(5,5)]	
/*	
//CHG.FT05F001 DD DATA,SPACE>[CYL,(1,1)]	

9999
SAMPLE RUN - INPUT DATA BASED ON RESULTS FOR 11 NON-ISO AIRCRAFT SAMPLE

4.88000	2.00000	3.02000	1.05200	3.03000	1.04600	0.00729
0.79000	1.92000	0.00000	2.74000	0.00000		
25.00000	30.00000	35.00000	40.00000	45.00000	50.00000	
43.20000	26.70000	0.00000	0.00000	0.00000		
0.00101	0.00002	0.00000	0.00000	0.00000		
0.00000	0.00000	0.00000	0.00000	0.00000		
0.01488	-0.00002	0.00000	0.00000	0.00000		
0.24418	-0.00336	0.00000	0.00000	0.00000		
43.20000	26.70000	0.00000	0.00000	0.00000		
0.02032	-0.00030	0.00000	0.00000	0.00000		
0.01866	-0.00030	0.00000	0.00000	0.00000		
0.03996	-0.00159	0.00000	0.00000	0.00000		
0.10571	-0.00106	0.00000	0.00000	0.00000		
433.90000	417.00000	219.70000	5.00000	261.30000		
30.90000	39.40000	21.90000	0.33000	38.70000		
0.02016	-0.00030					
0.01842	-0.00030					
0.01811	-0.00159					
0.29232	-0.01105	0.00000	0.00000	0.00000		
1.10000	0.84000	5.00000	14.50000	0.00190		
3.50000	3.97000	13.30000	19.70000	0.27100		
8.20000	7.74000	3.30000	5.40000	0.16000		
1.70000	1.64000	2.80000	6.80000	0.98000		
7.70000	6.65000	0.00000	0.00000	50.00000	25.80000	2
11.30000	13.52000	0.00000	0.00000	13.90000	14.10000	2
6.80000	7.23000	0.00000	0.00000	29.80000	63.80000	2
3.50000	9.10000	0.00000	0.00000	25.70000	25.30000	2

9999
/*

```

//T9897V JOB 01: G. WANG. : ,PRTY>02 X1310
//C9897V EXEC P98456,PARM.ASSY>[MAP,LIST,BCD], C
// PARM.LKED>:LIST,XREF:,TIME>02,ACCT>035323007
//ASSY.SYSIN DD DATA,SPACE>[CYL:[1,1]] 1640 CDS
C NETWORK ANALYSIS MODEL-- 370

C PROGRAM CHECK(INPUT,TAPE5=INPUT,OUTPUT,TAPE6=OUTPUT) 10
COMMON TNE(20),PNEM(20),NNEM,TMHE(20),PMHE(20),NMHE,NBR,TMH(150), 20
120),PMH(150,20),NMH(20),TSP(150,20),PSP(150,20),NSP(20),LKFX(150), 30
2FHR(150),K(149),L(149),M(149),TNOR(20),PNOR(20),NNOR,BARN,DEV,TMH 40
3(20),PMH1(20),NMH1,FM,BARN,DEVM,BNE,DNE,BMHE,DMHE 50
DIMENSION HEAD(20) 60
C HEAD 9999 IN FIRST AND LAST CARD FOR END OF FILE TEST 62
HEAD(5,49) EOF9 64
C SET ORIGINAL VALUES 70
1 DO 40 I=1,20 80
TMH(I)=0.0 90
PMH(I)=0.0 100
40 CONTINUE 110
NMH=0 120
FM=1.0 130
BNE=0.0 140
DNE=0.0 150
BMHE=0.0 160
DMHE=0.0 170
HEAD(5,103) HEAD 180
IF(HEAD(1)-EOF9) 3,2,3 190
2 CALL EOJMS6 202
CALL EXIT 205
3 HEAD(5,100)NBR,NNEM,NMHE 210
HEAD(5,101)(TNE(I),I=1,NNEM) 220
HEAD(5,101)(PNEM(I),I=1,NNEM) 230
HEAD(5,101)(PMHE(I),I=1,NMHE) 240
HEAD(5,101)(PMHE(I),I=1,NMHE) 250
HEAD(5,102)(LKFX(I),I=1,NBR) 260
HEAD(5,101)(FHR(I),I=1,NBR) 270
HEAD(5,102)(NMH(I),I=1,NBR) 280
DO 10 I=1,NBR 290
NI=NMH(I) 300
HEAD(5,101)(TMH(I,J),J=1,NI) 310
READ(5,101)(PMH(I,J),J=1,NI) 320
10 CONTINUE 330
NI=NBR-1 340
DO 20 I=1,NI 350
HEAD(5,102) K(I),L(I),M(I) 360
20 CONTINUE 370
WRITE(6,300) HEAD 380
WRITE(6,301) 390
IF(NNEM) 60,60,50 400
50 WRITE(6,302) 410
WRITE(6,303) (TNE(I),I=1,NNEM) 420
WRITE(6,304) (PNEM(I),I=1,NNEM) 430

```


C	NMH(I) THE NUMBER OF VALUES IN THE TMH-PMH DISTRIBUTION FOR BRANCH	1300
C	LKFX(I) AN INTEGER SET ,LT. 1 IF I IS A LOOK BRANCH; AND SET ,GT.	1310
C	I IS A FIX BRANCH	1320
C	FHR(I) THE ESTIMATED RATIO OF CLOCK HOURS TO MANHOURS FOR BRANCH	1330
C	(1.0 FOR FIX PHASE BRANCHES)	1340
C	K(I),L(I) THE NUMBERS OF THE BRANCHES TO BE COMBINED IN STEP I	1350
C	M(I) SET ,EQ. 0 FOR PARALLEL BRANCHES, ,GT. 0 FOR SERIES BRANCH	1360
C C	C C	1370
C	COMMON TNEM(20),PNEM(20),NNEM,TMHE(20),PMHE(20),NMHE,NBR,TMH(150,	1380
C	120),PMHI(150,20),NMHI(20),TSP(150,20),PSP(150,20),NSP(20),LKFX(150),	1390
C	2FHR(150),K(149),L(149),M(149),TNOR(20),PNOR(20),NNOR,BARN,DEV,TMHI	1400
C	3(20),PMHI(20),NMHI,FN,BARM,DEVM,BNE,DNE,DMHE,DMHE	1410
C	DIMENSION T1(20),T2(20),T3(20),P1(20),P2(20),P3(20)	1420
C	CALCULATE SPAN TIME FOR EACH BRANCH	1430
C	DO 10 I=1,NBR	1440
C	NI=NMH(I)	1450
C	NSP(I)=NMH(I)	1460
C	DO 8 J=1,NI	1470
C	TSP(I,J)=TMH(I,J)*FHR(I)	1480
C	PSP(I,J)=PMH(I,J)	1490
C	8 CONTINUE	1500
C	10 CONTINUE	1510
C	TRANSFER TO 200 IF AN EMPIRICAL NORM DISTRIBUTION HAS BEEN INPUT	1520
C		1530
C	IF(NNEM) 100,100,200	1540
C	CALCULATE INSPECTION NORM AND MANHOURS BASED ON INPUT TASK MANHOURS	1550
C	FIND INSPECIOIN MANHOURS	1560
C	100 DO 102 I=1,NBR	1570
C	LK=1	1580
C	IF(LKFX(I)-1) 104,102,102	1590
C	102 CONTINUE	1600
C	STOP	1610
C	104 NI=NMH(LK)	1620
C	DO 110 I=1,NI	1630
C	P1(I)=PMH(LK,I)	1640
C	T1(I)=TMH(LK,I)	1650
C	110 CONTINUE	1660
C	LK=LK+1	1670
C	DO 120 I=LK,NBR	1680
C	IF(LKFX(I)-1) 112,120,120	1690
C	112 N2=NMH(I)	1700
C	DO 114 J=1,N2	1710
C	T2(J)=TMH(I,J)	1720
C	P2(J)=PMH(I,J)	1730
C	114 CONTINUE	1740
C	CALL CONV(P1,P2,P3,T1,T2,T3,M1,N2,N3)	1750
C	IF (NBR-I) 122,122,116	1760
C	116 NI=N3	1770
C	DO 118 J=1,NI	1780
C	T1(J)=T3(J)	1790
C	P1(J)=P3(J)	1800
C	118 CONTINUE	1810
C	120 CONTINUE	1820
C	122 NMHI=N3	1830
C	DO 124 I=1,NMHI	1840
C	TMHI(I)=T3(I)	1850
C	PMHI(I)=P3(I)	1860
C	124 CONTINUE	1870
C	CALL MNOV(TMHI,PMHI,NMHI,BARN,DEVM)	1880
C	CALCULATE INSPECTION NORM	1890
C	CALL NAM	1900
C	RETURN	1910
C	C C	1920
C	OUTPUT OF ABOVE CALCULATIONS CONSISTS OF THE FOLLOWING ITEMS	1930
C	TNOR(I),PNOR(I),NNOR,BARN,DEV -- ALL FROM NAM	1940
C	TMHI(I),PMHI(I) VALUES OF MANHOURS AND PROBABILITY DEFINING	1950
C	CALCULATED DISTRIBUTION OF INSPECTION MANHOURS	1960
C	NMHI THE NUMBER OF VALUES IN THE TMHI-PMHI DISTRIBUTION	1970
C	C C	1980
C		1990
C	CALCULATE AN ESTIMATE OF INSPECTION NORM AND MANHOURS	2000
C	CALCULATE ESTIMATE OF LOOK PHASE MANHOURS BASED ON INPUT TASK MANHOUR	2010
C	200 DO 202 I=1,NBR	2020
C	LK=1	2030
C	IF(LKFX(I)-1) 204,204,202	2040
C	202 CONTINUE	2050
C	STOP	2060
C	204 NI=NMH(LK)	2070
C	DO 206 I=1,NI	2080
C	P1(I)=PMH(LK,I)	2090
C	T1(I)=TMH(LK,I)	2100
C	206 CONTINUE	2110
C	NI=LK+1	2120
C	DO 216 I=NI,NBR	2130
C	IF(LKFX(I)-1) 208,208,216	2140
C	208 N2=NMH(I)	2150
C	DO 210 J=1,N2	2160

[illegible]

IF(M(NI)) 20,20,30	3046
C M .EQ. 0 FOR PARALLEL BRANCHES	3050
20 CALL MULT(PK,PL,PR,TK,TL,TR,NK,NL,NR)	3060
GO TO 32	3070
C M .GT. 0 FOR SERIES BRANCHES	3080
30 CALL CONV(PK,PL,PR,TK,TL,TR,NK,NL,NR)	3090
32 NSP(KBR)=NK	3100
DO 40 I=1,NK	3110
TSP(KBR,I)=TH(I)	3120
PSP(KBR,I)=PH(I)	3130
40 CONTINUE	3140
50 CONTINUE	3150
C STORE NORM DISTRIBUTION IN TNOR,PNOR	3160
NNOR=NSP(KBR)	3170
DO 60 I=1,NNOR	3180
TNOR(I)=TSP(KBR,I)	3190
PNOR(I)=PSP(KBR,I)	3200
60 CONTINUE	3210
C CALCULATE NORM MEAN AND STANDARD DEVIATION	3220
CALL MNDV(TNOR,PNOR,NNOR,BARN,DEV)	3230
C C	3240
C OUTPUT CONSISTS OF THE FOLLOWING ITEMS	3250
C TNOR(I),PNOR(I) VALUES OF TIME AND PROBABILITY DEFINING	3260
C DISTRIBUTION OF NORM TIME FOR THE INSPECTION	3270
C NNOR THE NUMBER OF VALUES IN THE TNOR-PNOR DISTRIBUTION	3280
C BARN THE MEAN VALUE OF TNOR	3290
C DEV THE STANDARD DEVIATION OF TNOR	3300
C C	3310
RETURN	3320
END	3330
SUBROUTINE MULT(P1,P2,P3,T1,T2,T3,N1,N2,N3)	3340
C THIS ROUTINE OUTPUTS AS T3-P3 THE PRODUCT OF T1-P1 AND T2-P2	3350
DIMENSION T1(20),T2(20),T3(20),P1(20),P2(20),P3(20),TH(40),PH(40)	3360
C THE PRODUCT OF P1 AND P2 IS PLACED IN P3	3370
C PLACE P1,T1,P2,T2 VALUES IN PH,TH	3380
N3=N1+N2	3390
DO 10 I=1,N1	3400
TH(I)=T1(I)	3410
PH(I)=P1(I)	3420
10 CONTINUE	3430
DO 12 I=1,N2	3440
TH(I+N1)=T2(I)	3450
PH(I+N1)=P2(I)	3460
12 CONTINUE	3470
C MULTIPLY P3 VALUES BY PROPER P1 AND P2 VALUES	3480
DO 20 I=1,N1	3490
DO 16 J=1,N2	3500
DIF=T2(J)-T1(I)	3510
IF(ABS(DIF)-5.E-7) 14,13,13	3520
13 IF(DIF) 16,14,15	3530
14 PH(I)=PH(I)+P2(J)	3540
GO TO 20	3550
15 IF(J-1) 151,151,152	3560
151 PH(I)=0.0	3570
GO TO 20	3580
152 PH(I)=PH(I)+P2(J-1)	3590
GO TO 20	3600
16 CONTINUE	3610
20 CONTINUE	3620
DO 30 I=1,N2	3630
DO 26 J=1,N1	3640
DIF=T1(J)-T2(I)	3650
IF(ABS(DIF)-5.E-7) 24,23,23	3660
23 IF(DIF) 26,24,25	3670
24 PH(I+N1)=PH(I+N1)+P1(J)	3680
GO TO 30	3690
25 IF(J-1) 251,251,252	3700
251 PH(I+N1)=0.0	3710
GO TO 30	3720
252 PH(I+N1)=PH(I+N1)+P1(J-1)	3730
GO TO 30	3740
26 CONTINUE	3750
30 CONTINUE	3760
C ARRANGE TH,PH IN ORDER OF INCREASING TH	3770
CALL ORD(TH,PH,N3)	3780
C ELIMINATE DUPLICATE TH-PH PAIRS	3790
32 DO 40 I=2,N3	3800
IF(ABS(TH(I)-TH(I-1))-5.E-7) 34,34,40	3810
34 K=I+1	3820
DO 36 J=K,N3	3830
TH(J-1)=TH(J)	3840
PH(J-1)=PH(J)	3850
36 CONTINUE	3860
N3=N3-1	3870
GO TO 32	3880
	3890

40 CONTINUE	3900
C ELIMINATE UNNECESSARY POINTS	3910
42 DO 48 I=2,N3	3920
IF(ABS(PH(I)-PH(I-1))-5,E-7) 44,44,48	3930
44 K=I+1	3940
DO 46 J=K,N3	3950
TH(J-1)=TH(J)	3960
PH(J-1)=PH(J)	3970
46 CONTINUE	3980
N3=N3-1	3990
GO TO 42	4000
48 CONTINUE	4010
C REDUCE VECTOR SIZES	4020
CALL REDC(TH,PH,N3)	4030
C PLACE PH VALUES IN P3, AND TH VALUES IN T3	4040
DO 50 I=1,N3	4050
P3(I)=PH(I)	4060
T3(I)=TH(I)	4070
50 CONTINUE	4080
RETURN	4090
END	4100
SUBROUTINE CONV(P1,P2,P3,T1,T2,T3,N1,N2,N3)	4110
C THIS ROUTINE OUTPUTS AS T3-P3 THE CONVOLUTION OF T1-P1 AND T2-P2	4120
DIMENSION P1(20),P2(20),P3(20),T1(20),T2(20),T3(20),PD1(20),	4130
IPD2(20),PROD(20,20),TT(20,20),TU(400),PROE(400)	4132
EQUIVALENCE (TU(1),TT(1,1))	4135
EQUIVALENCE (PROE(1),PROD(1,1))	4140
C CALCULATE DISCRETE PROBABILITY DENSITY FUNCTION	4150
PD1(1)=P1(1)	4160
PD2(1)=P2(1)	4170
DO 2 I=2,N1	4180
PD1(I)=P1(I)-P1(I-1)	4190
2 CONTINUE	4200
DO 3 I=2,N2	4210
PD2(I)=P2(I)-P2(I-1)	4220
3 CONTINUE	4230
C CALCULATE ELEMENTS OF MATRICES	4240
DO 20 I=1,N1	4250
DO 10 J=1,N2	4260
TT(I,J)=T1(I)+T2(J)	4270
PROD(I,J)=PD1(I)*PD2(J)	4280
10 CONTINUE	4290
20 CONTINUE	4300
N3=N1+N2	4310
C ARRANGE ELEMENTS IN ORDER OF INCREASING TT(I)	4320
DO 24 J=1,N2	4330
DO 23 I=1,N1	4340
K=I+N1*(J-1)	4350
TU(K)=TT(I,J)	4360
PROE(K)=PROD(I,J)	4370
23 CONTINUE	4380
24 CONTINUE	4390
CALL ORD(TT,PROD,N3)	4400
C ELIMINATE DUPLICATE VALUES IN TT	4410
32 DO 40 I=2,N3	4420
IF(ABS(TU(I)-TU(I-1))-5,E-7) 34,34,40	4430
34 PROE(I-1)=PROE(I-1)+PROE(I)	4440
GO TO 42	4450
40 CONTINUE	4460
GO TO 46	4470
42 K=I+1	4480
DO 44 J=K,N3	4490
TU(J-1)=TU(J)	4500
PROE(J-1)=PROE(J)	4510
44 CONTINUE	4520
N3=N3-1	4530
GO TO 32	4540
C CALCULATE CUMULATIVE PROBABILITY	4550
46 DO 50 I=2,N3	4560
PROE(I)=PROE(I)+PROE(I-1)	4570
50 CONTINUE	4580
C ELIMINATE UNNECESSARY POINTS	4590
N=2	4600
60 DO 62 I=N,N3	4610
K=I	4620
IF(ABS(PROE(I)-PROE(I-1))-5,E-7) 64,64,68	4630
62 CONTINUE	4640
GO TO 70	4650
64 N3=N3-1	4660
IF(N=N3) 66,66,70	4670
66 DO 67 J=K,N3	4680
PROE(J)=PROE(J+1)	4690
TU(J)=TU(J+1)	4700
67 CONTINUE	4710
N=K	4720
GO TO 60	4730
C REDUCE VECTOR SIZES IF NECESSARY	4740
70 CALL REDC(TT,PROD,N3)	

```

80 DO 85 I=1,N3
P3(I)=PROE(I)
T3(I)=TU(I)
85 CONTINUE
RETURN
END
SUBROUTINE ORD(TT,PROD,N3)
C THIS ROUTINE ARRANGES TT-PROD PAIRS IN INCREASING ORDER OF TT
DIMENSION TT(40),PROD(40)
N=N3-1
DO 27 I=1,N
K=I+1
DO 26 J=K,N3
IF(TT(I)-TT(J)) 26,26,25
25 HOLD=TT(I)
TT(I)=TT(J)
TT(J)=HOLD
HOLD=PROD(I)
PROD(I)=PROD(J)
PROD(J)=HOLD
26 CONTINUE
27 CONTINUE
RETURN
END
SUBROUTINE REDC(TT,PROD,N3)
C THIS ROUTINE REDUCES VECTORS TT,PROD TO ACCEPTABLE SIZES
DIMENSION TT(40),PROD(40)
70 IF(N3-20) 80,80,71
71 SUM=TT(3)-TT(1)
IDRP=2
DO 74 I=4,N3
TSUM=TT(I)-TT(I-2)
IF(TSUM-SUM) 72,74,74
72 SUM=TSUM
IDRP=I-1
74 CONTINUE
K=N3-1
DO 76 I=IDRP,K
TT(I)=TT(I+1)
PROD(I)=PROD(I+1)
76 CONTINUE
N3=K
GO TO 70
80 RETURN
END
SUBROUTINE MNDV(T,P,N,BART,SDEV)
C THIS ROUTINE CALCULATES THE MEAN AND STANDARD DEVIATION OF T
DIMENSION T(20),P(20)
BART=T(1)*P(1)
DO 10 I=2,N
BART=BART+T(I)*(P(I)-P(I-1))
10 CONTINUE
SDEV=P(1)*(T(1)-BART)**2
DO 20 I=2,N
SDEV=SDEV+(P(I)-P(I-1))*(T(I)-BART)**2
20 CONTINUE
SDEV=SDEV/20
RETURN
END
/* REQUIRED FORTRAN BCD SOURCE BEFORE THIS CARD
//LKED,SYSPRINT DD SPACE>[CYL,[1,1]]
//LKED,SYSDIN DD DATA,SPACE>[TRK,[5,5]]
/*
//CHG,FT05F001 DD DATA,SPACE>[CYL,[1,1]]
9999
SAMPLE CASE 1
11 5 5
0. 3. 4. 4.2 6.
0. .1 .5 .8 1.
0. 3. 4. 4.2 6.
0. .1 .5 .8 1.
0 2 0 2 0 2 0 2 0
1. 1. 1. 1. .5 1. .75 1.
.33 1. 1.
2 6 2 6 2 4 2 4 2 2
0. .5
0. 1.
0. .2 .4 .6 .8 1.
0. .2 .4 .6 .8 1.
0. 1.
0. 1.
0. .2 .5 .9 1.4 2.0
0. .2 .4 .6 .8 1.
0. 1.2
0. 1.
0. .1 .2 .4
0. .2 .8 1.

```

0.	.8		
0.	1.		
0.	.5	.7	.9
0.	.2	.6	1.
0.	1.5		
0.	1.		
0.	.3	.4	.5
0.	.4	.8	1.
0.	.8		
0.	1.		

3 4 1
7 8 1
2 7 1
2 3 0
1 2 1
5 6 1
9 10 1
5 9 0
1 5 1
1 1 1

SAMPLE CASE 2

1.	1.	1.	1.	1.	1.	1.
2	2	2	2	2	2	2

0.	1.5
0.	1.
0.	3.
0.	1.
0.	4.
0.	1.
0.	5.
0.	1.
0.	6.
0.	1.
0.	3.5
0.	1.
0.	2.
0.	1.
0.	7.
0.	1.

2 3 0
4 5 0
2 4 1
2 7 0
1 2 1
1 6 1
1 8 0

9999
/*

APPENDIX IV

ANALYSIS OF PE/IRAN INTERVAL DATA FROM SQUADRON RECORDS

APPENDIX IV

ANALYSIS OF PE/IRAN INTERVAL DATA FROM SQUADRON RECORDS

This appendix includes the dates and accumulated flight hours for aircraft at seven locations, by aircraft serial number. These data were analyzed to determine the PE and PE at IRAN intervals for all aircraft included. As a result, 164 observations of interval length were obtained.

A frequency distribution given by the histogram in Figure IV-1 was constructed from these data. The mean interval length is 277 FH with a standard deviation of 82 FH. This distribution differs significantly from that obtained from the data bank. The distribution given in Figure IV-2 (from the Phase II report) was generated from AFM 66-1 and AFM 65-110 data included in the data bank. This distribution has a mean of 218 FH with a standard deviation of 38 FH.

These results are significantly different. The standard error of the mean of the distribution obtained from the squadron data is $\frac{82}{\sqrt{164}} = 6.4$ FH. The standard error of the mean for the data-bank-derived distribution is $\frac{38}{\sqrt{256}} = 2.37$ FH. From these two standard errors, the difference in the means (277-218 = 59 FH) is $\frac{59}{6.83} = 8.6\sigma$. That is, the probability of this difference occurring by chance variation in the two samples is essentially zero.

Individual aircraft PE dates and accumulated flight hours from squadron data were compared with the aircraft inspection histories generated from the data bank in Phase II.

There are many cases where the differences between these two sources cannot be explained by other than errors in the flying-hour record in AFM 65-110 or in the squadron records.

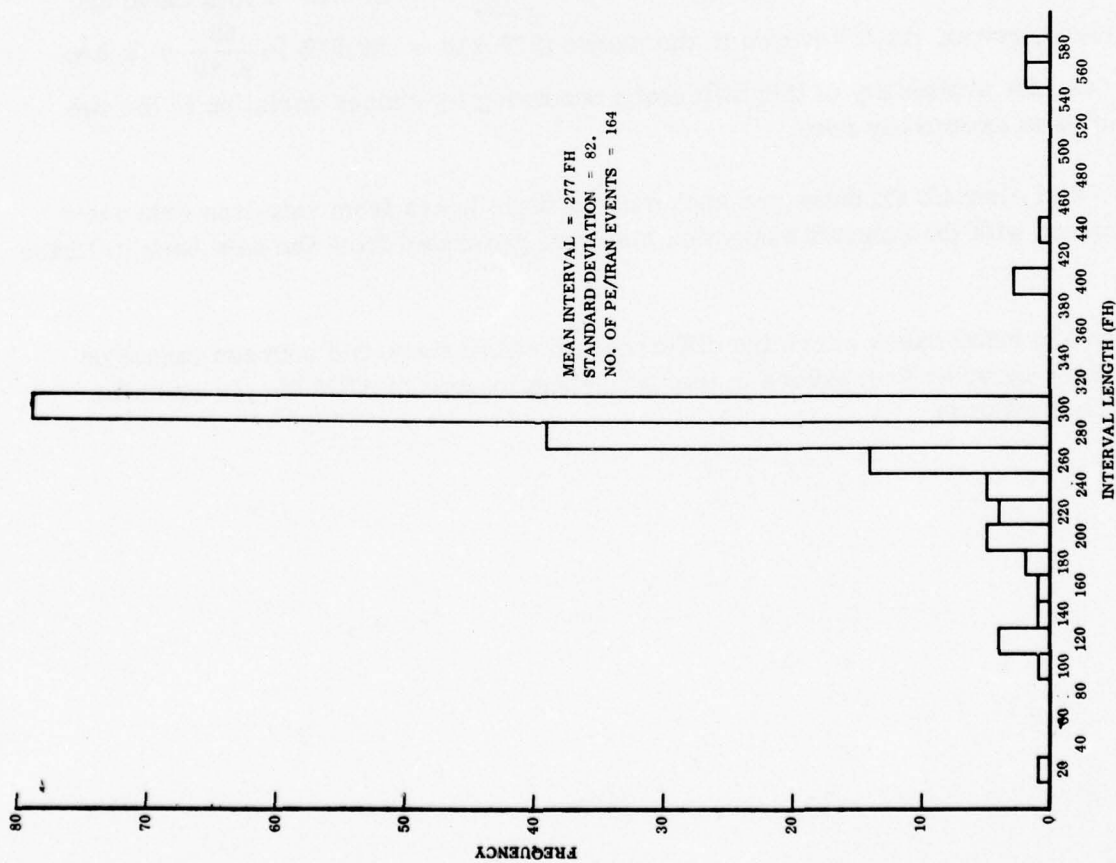


Figure IV-1. PE/IRAN Interval Distribution from Squadron Records

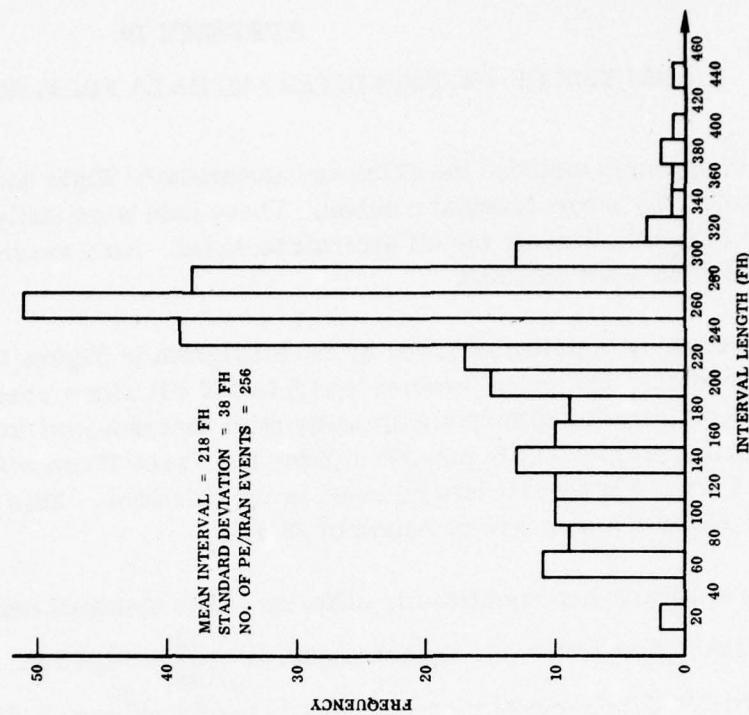


Figure IV-2. PE/IRAN Interval Distribution from 150-Aircraft Data Bank

PE/IRAN INTERVALS

SERIAL NO.	LOCATION	COMPL. DATE	ACC. FH	FH INTERVAL
59-028	Griffis	09 Apr 69	2003.5	
59-028		09 Jul 70	2243.0	239.5
59-028		15 Oct 71	2549.9	<u>306.9</u>
59-067		22 Apr 69	1951.6	
59-067		28 Oct 70	2237.6	286.0
59-069		21 Mar 69	1803.2	
59-069		27 Jan 70	1938.4	135.2
59-069		12 May 71	2225.0	286.6
59-071		11 Aug 69	2089.5	
59-071		29 Jun 70	2279.0	189.5
59-071		18 Sep 71	2588.0	309.0
59-072		19 Jun 69	1904.1	
59-072		21 Dec 70	2204.3	300.2
59-074		05 Feb 69	1859.6	
59-074		04 May 70	2159.6	300.0
59-074		29 Jun 71	2443.8	284.2
59-075		20 Apr 69	2057.0	
59-075		21 Apr 70	2266.4	209.4
59-075		17 Jul 71	2558.6	292.2
59-076		30 Jun 69	2131.2	
59-076		24 Nov 70	2431.8	300.6
59-077		24 Nov 69	2162.4	
59-077		17 Feb 71	2471.8	309.4
59-078		29 Aug 69	2195.7	
59-078		10 Sep 70	2496.9	301.2
59-078		30 Sep 71	2797.7	<u>300.8</u>
59-080		06 Nov 69	2227.4	
59-080		16 Mar 71	2520.7	293.3
59-081		15 Sep 69	1986.6	
59-081		16 Oct 70	2214.6	228.0
59-083		06 Feb 69	1985.8	
59-083		08 Mar 70	2229.3	243.5
59-083		12 May 71	2512.0	282.7
59-084		28 Feb 69	2059.0	
59-084		26 May 70	2359.0	300.0
59-084		20 Aug 71	2614.7	255.7
59-106		23 Jun 69	2066.9	
59-106		25 May 70	2275.2	208.3
59-106		30 Jul 71	2577.4	302.2
59-161		26 Oct 69	2132.1	
59-161	Griffis	10 Sep 70	2380.5	248.4

SERIAL NO.	LOCATION	COMPL. DATE	ACC. FH	FH INTERVAL
59-161	Griffis	22 Jun 71	2686.0	305.5
59-2515	Griffis	16 Jun 69	1953.1	
59-2515	Griffis	26 Sep 70	2349.0	395.9
59-009	IRAN	11 Apr 69	1715.7	
59-009		29 Jun 71	2268.1	552.4
59-020		04 Jul 70	2191.7	
59-020		28 May 71	2480.8	289.1
59-049		09 Jul 69	2105.2	
59-049		26 Jun 70	2344.6	239.4
59-049		14 Aug 71	2638.8	294.2
59-052		23 Jan 70	2190.1	
59-052		28 Apr 71	2493.0	302.9
59-053		21 Nov 69	2181.6	
59-053		15 Dec 70	2484.7	303.1
59-053		15 Oct 71	2782.6	<u>297.9</u>
59-056		22 Jun 69	2047.2	
59-056		25 Aug 70	2348.5	301.3
59-056		18 Sep 71	2652.7	304.2
59-060		10 Feb 70	2290.7	
59-060		06 Feb 71	2569.1	278.4
59-062		13 Aug 69	2230.1	
59-062		08 Sep 70	2525.5	295.4
59-063		10 Jun 69	1905.7	
59-063		17 Jul 70	2200.0	294.3
59-066		25 Sep 69	2270.9	
59-066		18 Jun 70	2521.3	250.4
59-103		21 Apr 70	2073.4	
59-103		07 May 71	2372.9	299.5
59-115		Oct 69	1894.4	
59-115		16 Oct 70	2195.8	301.4
59-129		31 Jan 69	1997.2	
59-129		05 Feb 71	2427.0	429.8
59-130		27 Mar 69	2222.9	
59-130		06 Apr 70	2522.3	299.4
59-130		18 Apr 71	2751.3	229.0
59-138		03 Sep 69	2427.0	
59-138		05 Oct 71	2718.4	291.4
59-140		At IRAN Now		
57-2509		26 Feb 69	2099.0	
57-2509		05 May 70	2391.9	292.9
57-2509		08 Jul 71	2694.6	302.7
57-2512	IRAN	25 Sep 69	1832.4	

SERIAL NO.	LOCATION	COMPL. DATE	ACC. FH	FH INTERVAL
57-2512	IRAN	08 Jan 71	2128.8	296.4
57-230	IRAN	31 Mar 70	2581.0	
57-230	87th (Sawyer)	21 Mar 72	2881.0	300.0
57-231	IRAN	06 Mar 69	2004.7	
57-231	IRAN	30 Jun 71	2682.0	
59-032	87th	26 Nov 71	2743.5	
59-035		05 Apr 72		
59-051	IRAN	21 Apr 72	2925.0	
59-086	IRAN	19 Aug 71	954.7	
59-088	IRAN	21 Aug 70	2648.5	
59-089	IRAN	14 May 69	2220.9	
59-089	IRAN	30 Nov 71	2906.4	
59-089	87th	04 Jun 72	3087.8	181.4
59-090	IRAN	08 Dec 69	2184.4	
59-090	87th	02 Nov 71	2750.7	566.3
59-091	IRAN		2630.5	
59-092	Transferred — No Record Available			
59-093	IRAN	04 Jan 71	2602.0	
59-093	87th	21 Jan 72	2899.2	297.2
59-094	IRAN	03 Mar 70	2344.1	
59-094	87th	26 Feb 72	2959.8	
59-095	IRAN	02 Sep 70	2507.1	
59-096	IRAN	15 Jul 69	2043.1	
59-096	IRAN	14 Feb 72	2655.2	
59-097	IRAN	29 Jun 70	2427.2	
59-097	87th	08 May 72	3014.0	586.8
59-099	No Records — Transferred to IRAN			
59-101	IRAN	07 Jan 70	2360.7	
59-101	IRAN	06 Feb 72	2950.2	
58-102	IRAN	25 May 70	2413.3	
59-155 (B)	IRAN	24 Oct 69	1969.3	
59-160 (B)	IRAN	21 Apr 70	2310.9	
59-160 (B)	87th	21 Apr 72	2915.1	
59-002	IRAN	11 Aug 69	2381.3	
59-002	5th (Minot)	25 Aug 70	2674.3	293.0
59-005	IRAN	30 Oct 69	2364.6	
59-005	Minot	02 Feb 71	2660.1	295.5
59-006	Minot	31 Jan 69	1830.2	
59-006	IRAN	19 Dec 69	2090.2	260.0
59-006	Minot	13 Apr 71	2377.4	287.2
59-010	IRAN	10 Jun 70	2432.1	

SERIAL NO.	LOCATION	COMPL. DATE	ACC. FH	FH INTERVAL
59-010	Minot	22 Jul 71	2739.1	307.0
59-012	IRAN	17 Nov 70	2738.2	
59-012	Minot	23 Oct 71	3018.9	280.7
59-015	IRAN	27 Mar 69	2098.5	
59-015	Minot	21 Apr 70	2388.6	290.1
59-015	IRAN	27 Aug 71	2641.0	252.4
59-018	Minot	17 Nov 69	2404.1	
59-018	Minot	19 Mar 71	2693.2	289.1
59-019	IRAN	12 Jun 69	2374.4	
59-019	Minot	13 Nov 70	2665.2	290.8
59-030	IRAN	06 Oct 69	2347.2	
59-030	Minot	28 Dec 70	2625.8	278.6
59-104	IRAN	11 Feb 69	1495.2	
59-104	Minot	16 Feb 70	1797.3	302.1
59-104	IRAN	07 Apr 71	1950.0	152.7
59-105	IRAN	15 Jul 69	2281.2	
59-105	Minot	24 Aug 70	2572.9	291.7
59-105	Minot	31 Aug 71	2822.4	249.5
57-236	Minot	26 Mar 69	2088.4	
57-236	IRAN	06 Jan 70	2292.9	204.5
57-236	Minot	26 May 71	2577.2	284.3
57-237	Minot	03 Feb 69	1845.5	
57-237	IRAN	11 Jan 70	2106.0	260.5
57-237	Minot	01 Oct 70	2387.5	281.5
57-244	IRAN	17 May 69	2147.9	
57-244	Minot	11 Jun 71	2428.7	280.8
56-460	Minot	23 Oct 69	2392.4	
56-460	Minot	27 Apr 71	2686.8	294.4
56-461	IRAN	25 Feb 69	1911.4	
56-461	Minot	19 Jan 70	2214.6	302.7
56-461	IRAN	13 Jul 71	2492.6	278.0
57-2545	Minot	29 Jul 69	2476.0	
57-2545	IRAN	01 Sep 70	2778.7	302.7
57-2545	Minot	21 Jun 71	3068.2	289.5
58-901	IRAN	19 Mar 69	2384.2	
58-901	Minot	09 Mar 70	2684.9	300.7
56-453	IRAN	23 Jul 69	2142.6	
56-453	Sqdrn	31 Jul 70	2435.4	292.8
56-453	Sqdrn	31 Aug 71	2725.5	290.1
56-458	IRAN	05 May 70	2044.0	
56-458	Sqdrn	28 Jun 71	2331.9	287.9

SERIAL NO.	LOCATION	COMPL. DATE	ACC. FH	FH INTERVAL
56-458	Sqdrn	09 Jun 72	2614.6	282.7
56-462	IRAN	26 Sep 70	2155.4	
56-462	Sqdrn	03 Dec 71	2455.8	300.4
57-241	IRAN	02 Feb 69	2047.8	
57-241	Sqdrn	15 Aug 70	2446.9	399.1
57-241	IRAN	28 Jun 71	2651.4	204.5
57-241	Sqdrn	28 Jun 72	2950.4	299.0
58-764	IRAN	26 Apr 71	2385.5	
58-764	Sqdrn	14 Apr 72	2659.2	273.7
58-792	IRAN	19 Jul 70	2431.9	
58-792	Sqdrn	12 Aug 71	2726.5	294.6
58-792	Sqdrn	09 May 72	3026.4	299.9
59-024	IRAN	27 Oct 69	2000.3	
59-024	Sqdrn		2297.9	297.6
59-024	Sqdrn	27 Oct 71	2585.2	287.3
59-085	IRAN	15 Aug 69	2120.5	
59-085	Sqdrn	15 Sep 70	2415.1	294.6
59-085	Sqdrn	03 Dec 71	2715.1	300.0
59-116	IRAN	23 Apr 69	1977.5	
59-116	Sqdrn		2276.5	299.0
59-116	Sqdrn	20 May 71	2557.9	281.4
59-122	Sqdrn	02 Feb 70	2312.6	
59-122	Sqdrn	06 Feb 71	2601.3	288.7
59-122	IRAN	08 Sep 71	2730.1	128.8
59-123	Sqdrn		2077.4	
59-123	Sqdrn	25 Mar 71	2375.1	297.7
59-123	IRAN	20 Jul 71	2399.1	24.0
59-123	Sqdrn	27 Mar 72	2695.4	296.3
59-126	IRAN	02 Oct 69	2009.7	
59-126	Sqdrn	12 Jan 71	2304.5	294.8
59-126	Sqdrn	01 May 72	2605.5	301.0
59-127	Records at IRAN			
59-128	IRAN	02 Dec 69	2038.3	
59-128	Sqdrn		2329.0	290.8
59-128	Sqdrn	15 Nov 71	2609.8	280.8
59-132	Sqdrn	20 Oct 70	2392.9	
59-132	Sqdrn	02 Sep 71	2685.1	292.2
59-133	IRAN	18 Feb 70	1987.8	
59-133	Sqdrn	11 Mar 71	2268.1	280.3
59-133	Sqdrn	20 Jan 72	2566.3	298.2
59-135	IRAN	17 Feb 71	2422.8	
59-135	Sqdrn	29 Dec 71	2709.5	286.7

SERIAL NO.	LOCATION	COMPL. DATE	ACC. FH	FH INTERVAL
59-137	IRAN	29 Apr 70	2249.9	
59-137	Sqdrn	03 Jun 71	2523.8	273.9
59-157	IRAN	06 Aug 70	2186.6	
59-157	Sqdrn	02 Jul 71	2454.4	267.8
59-157	Sqdrn	16 Feb 72	2705.0	250.6
59-158	IRAN	02 Feb 70	2203.0	
59-158	Sqdrn	23 Nov 70	2499.1	296.1
59-158	Sqdrn	12 Oct 71	2785.4	286.3
59-158	Sqdrn	29 Jun 72	3065.7	280.3
57-2496	IRAN	08 Jan 70	2348.7	
57-2497	IRAN	21 May 69	1873.1	
58-778	IRAN	07 May 69	1465.9	
58-778	IRAN	28 Jul 71	1719.9	254.0
58-795	IRAN	22 Jan 69	1641.6	
58-795	Tyndall	08 Jan 71	1901.3	259.7
59-004	Tyndall	02 Sep 69	2327.5	
59-004	Tyndall	17 Jun 70	2625.5	298.0
59-004	IRAN	18 Feb 71	2815.6	190.1
59-004	Tyndall	26 Oct 71	3095.0	279.4
57-2508	Records at IRAN			
57-2510	Tyndall	22 Oct 69	2156.2	
57-2510	IRAN	22 Nov 70	2408.0	251.8
57-2510	Tyndall	06 Oct 71	2694.0	286.0
57-2517	Tyndall	12 Mar 70	1715.5	
57-2517	IRAN	22 Dec 70	1808.1	92.6
57-2521	IRAN	06 Aug 70	1419.6	
57-2527	IRAN	27 Feb 69	1886.9	
57-2527	Tyndall	12 Aug 70	2164.6	277.7
57-2527	IRAN	08 Jul 71	2279.0	114.4
57-2528	IRAN	14 Feb 69	1314.4	
57-2528	IRAN	25 Mar 71	1706.7	392.3
57-2530	IRAN	23 Feb 70	1562.5	
57-2530	Tyndall	07 Jul 71	1838.1	275.6
57-2532	Tyndall	16 Dec 69	2043.6	
57-2532	Tyndall	08 Mar 71	2343.5	299.9
57-2536	IRAN	21 Nov 69	1056.2	
57-2537	Tyndall	10 Oct 69	1585.9	
57-2537	IRAN	09 Feb 71	1889.1	303.2
57-2538	IRAN	28 May 69	1809.1	
57-2538	IRAN	31 Jul 71	2399.2	590.1
57-2539	IRAN	08 Mar 70	2109.6	

SERIAL NO.	LOCATION	COMPL. DATE	ACC. FH	FH INTERVAL
57-2539	Tyndall	11 Jan 71	2409.0	299.4
57-2539	Tyndall	30 Nov 71	2660.5	251.5
57-2540	IRAN	22 Mar 70	2060.8	
57-2540	Tyndall	04 Feb 71	2360.8	300.0
57-2540	Tyndall	15 Nov 71	2611.4	250.6
57-2541	Tyndall	25 May 69	1902.0	
57-2541	IRAN	24 Aug 70	2206.2	304.2
57-2543	Tyndall	21 Mar 69	1839.6	
57-2543	IRAN	10 Jul 70	2138.5	298.9
57-2543	Tyndall	27 May 71	2432.4	293.9
57-2546	Tyndall	19 Mar 69	2024.3	
57-2546	IRAN	11 Sep 70	2321.1	296.8
57-2546	Tyndall	27 Sep 71	2609.7	288.6
57-2547	IRAN	25 Aug 69	1814.8	
57-2547	Tyndall	01 Nov 71	2114.8	300.0
58-900	Tyndall	24 Nov 69	1950.6	
58-900	IRAN	17 Feb 71	2233.2	282.6
58-902	Tyndall	31 Jan 70	1792.2	
58-902	IRAN	16 Jun 71	1918.8	126.6
58-903	Tyndall	28 Jan 69	1854.1	
58-903	IRAN	28 May 70	2158.5	304.4
58-903	Tyndall	14 May 71	2450.8	292.3
58-904	At Speedline			
59-159	At Depot			
59-164	At IRAN			
59-165	IRAN	01 Dec 69	1053.6	
59-165	Tyndall	02 Dec 70	1353.6	300.0
59-165	Tyndall	13 Oct 71	1633.8	280.2
59-457	IRAN	10 Jan 69	1970.8	
59-457	318 FIS	27 Apr 70	2267.3	296.5
59-457	IRAN	12 Jan 71	2390.5	123.2
59-457	318 FIS (ISO)	15 Jan 72	2673.8	(283.3)
59-459	IRAN	11 Sep 70	2099.3	
59-459	318 FIS (ISO)	16 Dec 71	2477.0	(377.7)
59-466	IRAN	17 Dec 69	2543.7	
59-466	318 FIS	12 Dec 70	2833.4	289.7
59-466	318 FIS (ISO)	13 Feb 72	3151.9	(318.5)
59-234	IRAN	05 May 69	2210.0	
59-234	318 FIS	27 Jul 70	2503.8	293.8
59-234	318 FIS (ISO)	10 Nov 71	2776.9	
59-243	318 FIS	03 Apr 69	1983.7	
59-243	IRAN	20 May 70	2251.8	268.1

SERIAL NO.	LOCATION	COMPL. DATE	ACC. FH	FH INTERVAL
59-243	318 FIS (ISO)	17 Jul 71	2547.4	
59-776	318 FIS	27 Feb 70	1767.4	
59-776	318 FIS (ISO)	07 Apr 71	2086.0	
59-776	318 FIS (ISO)	20 Mar 71	2418.1	
59-054	318 FIS	19 Mar 69	2009.8	
59-054	IRAN	25 May 70	2224.7	214.9
59-054	318 FIS (ISO)	29 Jul 71	2510.6	
59-057	IRAN	09 May 69	2136.8	
59-057	318 FIS	02 Jul 70	2435.2	298.4
59-057	318 FIS (ISO)	28 Jun 71	2716.3	
59-058	IRAN	21 May 69	2198.1	
59-058	318 FIS	18 Oct 70	2492.7	294.6
59-058	318 FIS (ISO)	02 Dec 71	2826.7	
59-059	IRAN	07 Apr 69	2294.0	
59-059	318 FIS	11 Jul 70	2577.0	283.0
59-059	IRAN	28 Jun 71	2805.2	228.2
59-108	318 FIS	04 May 69	2271.6	
59-108	IRAN	04 Aug 70	2554.1	282.5
59-108	318 FIS (ISO)	11 Sep 71	2850.3	
59-110	318 FIS	16 Mar 70	2347.5	
59-110	318 FIS (ISO)	28 May 71	2659.8	
59-119	IRAN	21 Jan 70	2366.8	
59-119	318 FIS	26 Jan 71	2650.5	283.7
59-119	318 FIS (ISO)	04 Apr 72	2960.2	
59-141	IRAN	10 Mar 70	2370.5	
59-141	318 FIS (ISO)	23 Apr 71	2645.4	
59-141	318 FIS (ISO)	15 Apr 72	2995.3	
59-143	IRAN	07 Mar 69	2180.9	
59-143	318 FIS	15 May 70	2471.1	290.2
59-143	IRAN	31 Mar 71	2706.1	235.0
59-143	318 FIS (ISO)	30 Mar 72	3016.9	
59-144	IRAN	01 Jul 69	2172.1	
59-144	318 FIS	25 Aug 70	2471.9	299.8
59-144	318 FIS (ISO)	30 Oct 71	2819.1	
59-145	IRAN	05 Apr 70	2551.0	
59-145	318 FIS (ISO)	10 May 71	2844.2	
59-145	318 FIS (ISO)	19 May 72	3155.1	
59-151	IRAN	12 Aug 69	2329.0	
59-151	318 FIS	24 Aug 70	2612.9	283.9
59-151	318 FIS (ISO)	29 Aug 71	2924.3	
59-152	318 FIS	26 Jun 69	2277.7	
59-152	IRAN	28 Oct 70	2582.3	304.6

SERIAL NO.	LOCATION	COMPL. DATE	ACC. FH	FH INTERVAL
59-152	318 FIS (ISO)	08 May 72	2933.1	
59-147	Records at IRAN — 333.3 Hours Flown Since Last PE.			

APPENDIX V

REVISED MAINTENANCE PACKAGE

PREFLIGHT INSPECTION

This inspection will be accomplished only before the first flight of the day.

WUC	DESCRIPTION	MAN TIME (min)
PREP	Portable Fire Extinguisher Provided.	001
PREP	External Ground Heat Source Provided (If Required)	001
PREP	High Pressure Air Compressor Provided.	001
PREP	External Power Source Provided.	001
PREP	All Pins, Covers, Inlet and Boundary Duct Plugs (Except Pitot Cover) Removed.	003
PREP	Canopy Hold-Open Support Assembly Installed When Canopy is Open.	001
PREP	Seat Ejection Safety Pin(s) Installed.	001
PREP	Landing Gear Handle in Down Position.	001
PREP	Armament System Control Switches and Fuses for Correct Position. (If Armament is Loaded Switches must be Safetied.)	001
PREP	Review Aircraft Forms	005
PREP	Aircraft Properly Grounded	002
PREP	Right Engine Access Compartment Door Opened.	003
PREP	Arresting Gear Hook Retracted and Latched, Safety Pin Installed. (Rotate Latch Shaft Approximately 5 Degrees Beyond Lock Position and Back to Stop to Assure Positive Latching).	001
PREP	Tail Pipe Shield Assembly Removed.	001
PREP	Left Engine Compartment Access Door Opened (Door to Remain Open Until After Engine Start).	003
PREP	Heat Exchanger Exhaust Cover and Artificial Feel System Intake Tube Covers Removed.	001
PREP	Armament Safety Switch in Groundborne Position.	001
PREP	Armament Selector Switch in Vis Indent Position.	001
PREP	Arming Switch in Safe Position.	001
PREP	External Fuel Tank Ejection System Cont Fuse in Cockpit for Proper Installation. Insure Ground Safety Pins Installed. (Pins will be Removed During Pilots Preflight Inspection).	003

WUC	DESCRIPTION	MAN TIME (min)
PREP	Left Engine Compartment Access Door Closed. (After Engine Start).	002
PREP	Panels and Doors Secured (After Engine Start).	001
PREP	Speed Brakes Closed and No Evidence of Fluid Leakage (381) (After Engine Start).	001
11---	Fuselage for Damage, Aerodynamic Smoothness, and Freedom from Ice, Frost, or Foreign Material (230).	002
11---	Engine Inlet Ducts for Foreign Objects (Physical Entry Required).	005
11---	Exterior of Fuselage for Evidence of Fuel and Oil Leakage (381).	001
11F--	Wing Surface for Damage, Aerodynamic Smoothness, and Freedom from Ice, Frost, or Foreign Material.	002
11F--	Exterior of Wing for Evidence of Fuel Leakage (381) and Hydraulic Fluid (381) at Outboard Elevon Fairing.	002
11GA-	Vertical Stabilizer Surfaces for Damage, Aero- dynamic Smoothness, and Freedom from Ice, Frost, or Foreign Material (230).	001
11E--	Wing Surface for Damage, Aerodynamic Smoothness, and Freedom from Ice, Frost, or Foreign Material.	002
11E--	Exterior of Wing for Evidence of Fuel Leakage (381) and Hydraulic Fluid (381) at Outboard Elevon Fairing.	002
11D--	Fuselage for Damage, Aerodynamic Smoothness, and Freedom from Ice, Frost, or Foreign Material.	002
11---	Camlocs Fwd Intake Area for Security	001
11D--	Exterior of Fuselage for Evidence of Fuel and Oil Leakage (381).	001
11---	Windshield and Canopy for Cleanliness (230), Cra- zings (605), Cracks (190), Delamination (846), and Damage.	001
12BC1	Seat Ejection Handle Hold Down Cable Ball Ends for Engagement (Immediately Prior to Flight).	003
12BP1	Ballistic Hose Quick Disconnect(s) Engaged (730).	001
12B--	Parachute Disconnect Release Handle Stowed and Lap Belt and Shoulder Harness Secure.	001
12AD1	Accessible Cockpit Floor and Control Stick Area for Presence of Water and Foreign Material.	001
13AAA	Shock Strut for Specified Inflation (5-5/16 Inch Between Torque Arm Pins, Center to Center).	001
13---	Shock Strut and Actuating Cylinder for Leakage (381) and Obvious Damage. Clean Oleo Strut.	001
13DC1	Tire for Specified Inflation (Not More Than 6 Hours Prior to Flight), Chalk Tire.	001
13DC1	Tire for Cuts (116) and Freedom from Fuel, Grease, or Oil (230).	001
13DC1	Tire for Specified Inflation (Not more than 6 Hours Prior to Flight), Chalk Tire.	001

WUC	DESCRIPTION	MAN TIME (min)
13DC1	Tire for Cuts (116) and Freedom from Fuel, Grease or Oil (230).	001
13AAA	Shock Strut for Specified Inflation (5-5/16 Inch Between Torque Arm Pins, Center to Center).	001
13---	Shock Strut and Actuating Cylinder for Leakage (381) and Obvious Damage. Clean Oleo Strut.	001
13DD1	Nose Tires for Cuts (116) and Freedom from Fuel, Grease, or Oil (230).	001
13ACF	Nose Gear Scissor Disconnect Pin for Engagement.	001
13ACA	Nose Gear Shock Strut for Specified Inflation.	001
13---	Nose Gear Shock Strut and Actuation Cylinder for Leakage (381) and obvious damage. Clean Oleo Strut.	001
13DJ1	Brake Reservoir Indicator Rods for Specified Extension (Normal) (Vertical Instr A/C Only).	001
13DD1	Nose Tires for Specified Inflation (Refer to -2 Handbook) Not More Than 6 Hours Prior to Flight. (Note: Chalk Tire with Specified Pressure, Time and Date).	001
23KQP	Starter Ignition Disarm Switch for Closed Position.	001
23KQA	Starter for Air I/A/W T.O. 1F-106A-2-4.	003
23K--	Starter Air Supply Hose for Blisters on Outer Cover (After Engine Start).	001
23S--	Constant Speed Drive for Proper Venting (After Engine Start).	001
23---	Engine Components for Fuel, Oil and Hydraulic Fluid Leakage (381) (After Engine Start).	001
41BA1	Ground Cooling Check Valve for Leakage after Engine Start.	001
42AJ1, AK1	Fuse Panel for Blown Fuses.	002
45J--	RTM Hydraulic Pumps, Lines and Accessories for Security (730), Leakage (381) and Evidence of Chafing (020) Adjacent Components. Accumulator Precharge Pressure within Specified Limits (1200 to 1500 PSI). System for Proper Fluid Level.	003
45---	Hydraulic Accumulators for Specified Preload (750 +/- 25 PSI at 70 Deg F).	002
45---	Hydraulic Reservoirs for Specified Pressurization (Prior to Engine Run). 50-60 PSI.	001
45---	Hydraulic Reservoirs Sight Gages for Specified Fluid Level (Service with Hydraulic Fluid MIL-H-5606 When 3/4 Inch or More Below Full Mark).	001
45E--	High Pressure Pneumatic System for Specified Pressure (3000 PSI).	003
46---	Fuel Drains for Water and Foreign Material (230).	004
46---	Fuel Valve Position Indicators for Open Position.	001

WUC	DESCRIPTION	MAN TIME (min)
46H--	External Tank, Fairing/Pylon and Sway Brace Pads for Damage and Security (730). External Fuel Tank Cap for Security.	001
46---	Pneumatic Pressure Sensing, Vent, and External Tank Pressurization Line Moisture Drain Valves for Water.	002
46---	Fuel Drains for Water and Foreign Material (230).	002
46H--	External Tank, Fairing/Pylon and Sway Brace Pads for Damage and Security (730).	001
46---	Fuel Drains for Water and Foreign Material (230).	002
46G--	Fuel Quantity Indicator for Specified Service Indication (Mission Requirements).	001
46NA1	Engine Fuel Supply Strainer Indicating Rod for Specified Position after Engine Start.	002
46J--	Operational Check of Slipway Door, Door Lights, and Receptacle Hooks After Engine Start (When Required).	005
47CD1	Emergency Oxygen Bottle for Specified Servicing According to Temperature Chart.	001
47A--	Oxygen Quantity Checked	001
51FD1	Pitot Cover Removed, Pitot Head for Heat Rise I/A/W T. O. 1F-106A-2-6. Pitot Cover Installed Until Pre-flight.	001
74BCB	Camera for Installation of Magazine (Top of Scope).	001
93AB1	Drag Chute Canister for Excessive Moisture (230).	002
93AA1	Drag Chute Installed.	002
97AM1	Seat Arming Initiator (M3A1) Visually for Evidence of Inadvertent Firing, Cable for Damage and Fraying (Particularly at Attaching Points), Cables Terminal Ends for Cracks (190), Damage and Security (730) (Immediately Prior to Flight) F-106A.	002

BASIC POSTFLIGHT INSPECTION

These inspection requirements will be accomplished after flight. The requirements are applicable to all classes of operation unless indicated otherwise in parentheses after the requirement. Requirements preceded by an asterisk (*) are applicable when the equipment concerned has been used and are accomplished after the last flight of the day. Requirements preceded by a double asterisk (**) are applicable only after the last flight of the day. Requirements preceded by a plus (+) are the only applicable requirements to be conducted between daily flights, i.e., through flight, turnaround, and also accomplished after the last flight of the day.

WUC	DESCRIPTION	MAN TIME (min)
PREP	+ Portable Fire Extinguishers Provided.	001
PREP	+ High Pressure Air Source Provided (If Required)	001
PREP	+ Approved Wheel Chocks in Proper Position.	002
PREP	+ Landing Gear and Tail Hook Safety Pins Installed.	002
PREP	* Aerial Refuel Slipway Door Open (Prior to Engine Shutdown).	001
PREP	** Review Aircraft Forms.	005
PREP	** Pitot-Radome-Canopy Cover, Artificial Feel System Intake Covers, Angle of Attack Transmitter Vane Cover, Boundary Layer Plugs, Intake Duct Shields, Tail Pipe Shield and Heat Exchanger Duct Shield Installed.	005
PREP	+ Aircraft Statically Grounded.	001
PREP	+ Canopy Hold-Open Support Installed.	001
PREP	+ Seat Ejection Safety Pin(s) Installed.	001
PREP	+ Master Electrical Power Switch Off, AC and DC Electrical Switches Off.	001
PREP	+ Arming Switch in Safe Position and Armament Selector Switch in Vis Ident Position, Armament Safety Switch in Nose Wheel Well in Groundborne Position. If Aircraft is Loaded, Switches Must be Safetied.	002
PREP	** External Elect Power Source Provided if Required.	001
PREP	+ External Fuel Tank Ejection System Cont Fuse in Cockpit for Specified Position. Remove Ground Safety Pins (Pins Will be Removed During Pilots Preflight Inspection).	003
PREP	** Pins, Locks, Covers, and Plugs Removed. Panels and Doors Secured. Speed Brakes Closed. No Evidence of Fluid Leakage (Immediately Prior to Flight).	002
11D--	** Exterior Fuselage for Damage, Aerodynamic Smoothness, and Evidence of Fuel and Oil Leakage (381).	002
11D--	+ Access Doors and Fasteners for Security (730).	001
11D--	+ Access Doors and Fasteners Forward and in Vicinity of Inlet Ducts for Security (730).	001

WUC	DESCRIPTION	MAN TIME (min)
11E--	+Wing for Damage, Aerodynamic Smoothness and Evidence of Fuel Leakage (381). Upper and Lower Wing Leading Edge Skin Aft of Slot Area, Adjacent to Bolt Holes Securing Leading Edge to Wing, Approximately Leading Edge Wing Station 325.0 for Cracks.	003
11GA-	**Vertical Stabilizer for Damage and Aerodynamic Smoothness.	002
11F--	+Wing for Damage, Aerodynamic Smoothness and Evidence of Fuel Leakage (381). Upper and Lower Wing Leading Edge Skin Aft Slot Area, Adjacent to Bolt Holes Securing Leading Edge to Wing, Approximately Leading Edge Wing Station 325.0 for Cracks.	003
11D--	**Exterior of Fuselage for Damage, Aerodynamic Smoothness, and Evidence of Fuel and Oil Leakage (381).	002
11D--	+Access Doors and Fasteners for Security (730).	002
11---	*Missile Bay Structure for Damage from Missile or Special Weapon Debris, Blast and Heat (900).	001
11---	**Missile Bay Area for Cleanliness (230) and Presence of Hydraulic Fluid (381).	001
11D--	+Access Doors and Fasteners Forward and in Vicinity of Inlet Ducts for Security (730).	001
11H--	+Windshield and Canopy for Cleanliness (230), Cracking (605), Cracks (190) and Damage.	001
12A--	**Cockpit for Cleanliness (230) All Knobs-Switches-Instruments and Console Panels for Security (730).	003
12BP1	**Seat Ejection Ballistic Hose for Kinks (780), Flat Spots (780), Damage, and Security (730).	002
12B--	**Seat Ejection System Quick-Disconnect Units for Positive Engagement (730).	001
12BC1	**Seat Ejection Handle Holddown Cable for Security (730).	001
13DB1	+Nose Wheels for Obvious Damage.	005
13DD1	+ Nose Wheel Tires for Excessive and/or Uneven Wear (020), Cuts (116), Blisters (782), Freedom from Fuel Grease or Oil (230) and Evidence of Tread Separation (782).	002
13ACA	**Nose Shock Strut for Leakage (381) and Obvious Damage.	003
13ACA	**Nose Gear Shock Strut for Specified Inflation.	004

WUC	DESCRIPTION	MAN TIME (min)
13ACF	**Nose Gear Scissor Disconnect Pin for Engagement.	001
13---	**Nose Gear and Door for Damage and Security (730).	003
13---	**Nose Gear and Door Actuating Cylinder for Leakage (381).	002
13---	+Main Gear, Door and Fairing for Damage, Cracks (190) and Security (730).	001
13B--	+Main Gear and Door Actuating Cylinder for Leakage (381). Door Actuator Rod End and Over Center Cable for Damage and Cracks (190).	001
13AAA	**Shock Sturt for Leakage (381), Obvious Damage, and Specified Inflation (5-5/16 Inches Between Torque Arms Pins, Center to Center).	002
13DA1	**Main Wheel for Damage and Evidence of Overheating (900) (Adjacent to Brakes).	001
13DC1	+Tire for Excessive and/or Uneven Wear (020), Cuts (116), Blisters, Freedom from Fuel, Grease or Oil (230), Evidence of Tread Separation (782) and Overheating (900).	002
13DE1	**Brake Automatic Adjuster Pins for Extension Beyond Specified Minimum Length. (15/32" Minimum Distance Between the Outer Face of Washer Under Adjustment Pin Nut and Outer Face of Adjustment Clamp Retaining Washer). (Retaining Ring for Instl).	005
13AAC	**Drag Brace Accumulator for Condensation (622). (When Ambient Temperature is Above Freezing). (If Bleed Fitting Installed).	002
13---	+Main Gear, Door and Fairing for Damage, Cracks (190) and Security (730).	001
13B--	+Main Gear and Door Actuating Cylinder for Leakage (381). Door Actuator Rod End and Over Center Cable for Damage and Cracks (190).	001
13AAA	**Shock Sturt for Leakage (381), Obvious Damage, and Specified Inflation (5-5/16 Inches Between Torque Arm Pins Center to Center).	002
13DA1	**Main Wheel for Damage and Evidence of Overheating (900) (Adjacent ot Brakes).	001
13DC1	+Tire for Excessive and/or Uneven Wear (020), Cuts (116), Blisters, Freedom from Fuel, Grease or Oil (230), Evidence of Tread Separation (782) and Overheating (900).	002
13DE1	**Brake Automatic Adjuster Pins for Extension Beyond Specified Minimum Length. (15/32" Minimum Distance Between the Outer Face of Washer Under Adjustment Pin Nut and Outer Face of Adjustment Clamp Retaining Washer). (Retaining Ring for Instl).	005

WUC	DESCRIPTION	MAN TIME(min)
13AAC	**Drag Brace Accumulator for Condensation (230) (When Ambient Temperature is Above Freezing). (If Bleed Fitting Installed).	002
14CG1	**Elevon for Damage and Aerodynamic Smoothness.	002
14D--	+Elevon Hydraulic Components for Evidence of Leakage (381).	001
14EN1	**Rudder for Damage and Aerodynamic Smoothness.	002
14FA1	**Accessible Rudder Hydraulic Components for Evidence of Leakage (381).	001
14J--	**Accessible Speed Brake Hydraulic Components for Evidence of Leakage (381), Security (730) and Chafing (020).	002
14J--	**Speed Brakes for Damage, Security (730) and Aerodynamic Smoothness, Door and Hinge Nodes for Cracks and Damage.	002
14J--	**Accessible Speed Brake Wiring for Chafing (020). Fraying (020) and Security (730).	001
14J--	**Speed Brake Doors for Excessive Movement Between Door and Hinge Nodes.	003
14J--	**Speed Brake Lower Hinge Fitting for Mission or Popped Attaching Screws (Fitting of Aircraft and Casting).	003
14CG1	**Elevon for Damage and Aerodynamic Smoothness.	002
14D--	**Elevon Hydraulic Components for Evidence of Leakage (381).	001
14HA1	**Feel Force Regulator for Evidence of Excessive Movement (730) and Feel Force Cylinder Regulator Inspection Shaft for Specified Position (127).	005
14CC1	**Flight Control Mixer Assembly for Damage, Security and Adequate Clearance.	005
14CC1	**Mixer Assembly and Immediate Area for Foreign Objects (230).	005
23---	+Accessible Components in Engine Compartment Particularly Air Oil Cooler Inlet Line (Lower) Quick Disconnect Coupling, for Fluid Leakage (381) Prior to Engine Shutdown.	005
23G--	**Exhaust Nozzle for Smooth Operation (Actuate Idle Thrust Switch Prior to Engine Shut down).	002
23---	**Engine for Audible Bearing Roughness (Engine Coast-Down).	001
23---	**Engine Turbine Shroud to Turbine Rotor Airseal for Audible Evidence of Interference (Engine Coast-down).	001

WUC	DESCRIPTION	MAN TIME (min)
23SR-	*Constant Speed Drive Oil Tank for Adequate Service Within 15 minutes After Engine Shutdown with Oil Spec MIL-L-7808. (Full As Indicated on Dip Stick).	003
23J--	*Engine Oil Tank for Adequate Servicing Within 15 Minutes After Engine Shutdown with Oil Spec MIL-L-7808. (Fill Tank to Full Mark on Dip Stick).	004
23SQ-	**Constant Speed Drive Gear Box Scavenge Return Line Chip Detector Plug for Metal Particles (372) (Resistance Check).	004
23---	**Accessible Engine Compartments for Cleanliness (230) and Fluid Leakage (381).	001
23---	**Accessible Engine Tubing and Hose Assemblies for Chafing (020) and Loose Fittings and Clamps (730).	001
23---	**Accessible Engine Electrical Units, Plugs and Terminals for Tightness (730).	001
23---	**Visible Engine Accessories and Constant Speed Remote Drive Unit for Security (730) and Evidence of Leakage (381).	001
23---	**Diffuser Case Vents for Evidence of Oil (381).	001
23SQ-	**Constant Speed Drive Remote Mounted Gear Box and Engine Mounted Gear Box Chip Detector Plugs for Metal Particles (372) (Resistance Check).	003
23GA-	**Afterburner for Rupture (111), Cracks (190), Distortion (780) and Heat Damage (900) (Physical Entry After Afterburner has Cooled).	006
23EBF	**Turbine Exhaust Section for Missing or Improperly Positioned Guide Vanes (Using Strong Light).	003
23EBF	**Turbine Exhaust Section for Missing or Improperly Positioned Guide Vanes (Physical Entry After Afterburner has Cooled).	010
23---	**Accessible Engine Compartments for Cleanliness (230) and Fluid Leakage (381).	001
23---	**Accessible Engine Tubing and Hose Assemblies for Chafing (020) and Loose Fittings and Clamps (730).	001
23---	**Accessible Engine Electrical Units, Plugs and Terminals for Tightness (730).	001
23---	**Visible Engine Accessories for Security (730) and Evidence of Leakage (381).	001
23---	**Diffuser Case Vents for Evidence of Oil (381).	001
23---	**Main Fuel Control, Fuel Pump, and Afterburner Fuel Control for Security (730) and Leakage (381), Particularly Around the Inlet and Outlet Connections.	003
23---	**Compressor Inlet Guide Vanes and Visible Compressor Blades for Damage (Physical Entry).	003

WUC	DESCRIPTION	MAN TIME (min)
42---	**Generators for Oil Leakage (381). (Ref to 1F-106A-2-10).	001
42---	**Spare Fuses Available (750).	001
42FB1	**Air Turbine Generator Motor for Specified Oil Level and Evidence of Leakage (381). Service with Oil Spec MIL-L-7808D Until Oil Level Reaches Full Mark on Sight Gage.	005
45---	+Primary and Secondary Hydraulic Reservoir Fluid Temperature Indicators for Excessive Heat and for Temperature Differential Beyond Specified Limits 40 Deg F Max After Eng Shutdown.	002
45EG1	**Pneumatic System for Moisture (Actuate Bleed Valve Forward Bulkhead Left Hand Wheel Well) (When Ambient Temperature is Above Freezing).	002
45E--	+High Pressure Pneumatic System for Specified System Pressure (3000 PSI).	001
45---	+Hydraulic Accumulators for Specified Preload (750+/- 25 PSI at 70 Deg F) and Evidence of Fluid Leakage (381).	001
45---	+Hydraulic Reservoirs for Leakage (381) and Sight Gages for Specified Fluid Level. (Service with Hydraulic Fluid MIL-H-5606 when 3/4 Inch or More Below Full Mark).	001
45---	**Hydraulic Reservoir Sight Gages for Specified Changes in Fluid Level with Reservoir Unpressurized and Pressurized (System Hydraulic Pressure Relieved). (Fluid Drop not to Exceed 1/4 Inch in Either Reservoir).	001
45---	**Accessible Hydraulic Components for Evidence of Leakage (381).	001
46NA1	+Engine Fuel Supply Strainer Indicator Rod for Specified Position. (If Extended, Manually Reset Indicator Rod Prior to Turning Off Boost Pumps and/or Shutting Down Engine). (If Rod Extends with Engine Running and Boost Pumps on, Shutdown Engine and Check Fuel Strainer for Contamination). (Through-Flight Requirement Only.)	002
46---	+Fuel Tanks Serviced. Compute Fuel Serviced to Fuel Remaining in Tanks.	015
46JA1	*Aerial Refuel Slipway Door and Adjacent Area for Damage and Cleanliness (230). (When Required).	002
46C--	**Pneumatic Pressure sensing, Vent and External Tank Pressurization Line Moisture Drain Valves in Main Wheel Well for Water.	001
46NA1	**Engine Fuel Supply Strainer for Water.	001
46HA1	**External Tank for Leakage (381), Cap for Security.	001

WUC	DESCRIPTION	MAN TIME (min)
46H--	**External Tank, Fairing/Pylon and Sway Brace Pads for Damage and Security (730) and External Tank for Dents (780) and Scratches (935).	002
46---	**Fuel Drains for Water and Foreign Material (230).	003
46CJ1	**Pneumatic Pressure Sensing, Vent and External Tank Pressurization Line Moisture Drain Valves in Main Wheel Well for Water.	001
46HA1	**External Tank for Leakage (381), Cap for Security.	001
46H--	**External Tank, Fairing/Pylon and Sway Brace Pads for Damage and Security (730) and External Tank for Dents (780) and Scratches (935).	002
46---	**Fuel Drains for Water and Foreign Material (230).	003
47A--	**Oxygen System Serviced.	010
47CD1	**Emergency Oxygen Bottle for Specified Servicing According to Temp-Press Chart.	001
93AB1	**Drag Chute Canister for Cleanliness (230), Damage, and Excessive Moisture (230).	002
93AA1	+Drag Chute Installed (Do not Install After Last Flight of Day).	005
97AM1	+Seat Arming Initiator (M3A1) Visually for Evidence of Inadvertent Firing, Cable for Damage and Fraying (Particularly at Attaching Points), Cable Terminal Ends for Cracks (190), Damage and Security (730) (Immediately Prior to Flight) F-106A. (Through Flight Requirement Only.)	002

SPECIAL INSPECTIONS

The special inspections, with the exception of the following, remain the same as those stated in Section II, Part A, of Technical Order 1F-106A-6, dated 1 January 1972, changed 1 June 1972.

11KJ1 Every 7 days accomplish the following:

Canopy Power Package Silver-Zinc Battery for Spec- 004 minutes
fied Individual Cell Potential and Total State of
Charge (Use Battery Tester).
(Tester Must Indicate Between 30.9 and 31.6 Volts
in B Position and Between 1.82 and 1.86 Volts for
Individual Cells 2 through 18.

42GA1 Every 7 days accomplish the following:

Emergency Power Package Silver-Zinc Battery for 004 minutes
Specified Individual Cell Potential and Total State
of Charge (Use Battery Tester).
(Tester Must Indicate Between 32.8 to 33.5 Volts
in B Position and Between 1.82 and 1.86 Volts for
Individual Cells 1 through 18.

Delete Item 13. A, WUC 11---

Delete Item 36. A, WUC 23MVO

MINOR INSPECTIONS

Minor inspection requirements will be performed every 100 flight hours except as noted. Requirements preceded by an asterisk (*) will be performed only at even minor inspections (every 200 flight hours).

WUCs	DESCRIPTION	MAN TIME (min)
11DA-11DA0	Fuselage Between Sta. 57.60 and 102.0 for Water (CAMLOC at Sta. 57.60 and Center Forward Direction Finding Antenna and Marker Beacon Antenna Installation Screws Removed. CAMLOC Drain Closed and Installation Screws Re-Installed Upon Completion of Inspection.).	005
11CA1, CAA, (11C--) 11CB1, CBA, 11CC1, CCA (106B), 11CD1, CDA, 11CE1, CEA, CF1, CFA, CG1, CGA	Fuselage Compartment Doors for Cracks (190), and Hinges, Fasteners, and Latches for Cracks (190), Wear (020), and Security (730), Deterioration (117), and Adjustment (127).	020
11JL1	*Canopy Latches for Specified Latching and Unlatching Force	004
11DDF, 11DEF, 11DCF	*Engine Inlet Ducts Through Sta. 439 for Aerodynamic Smoothness, Dents (780), Cracks (190) Corrosion and Freedom from Foreign Material (230).	015
11K-- , 11L-- , 11KD1	*Canopy Latch System Actuated Switches and Warning Switches for Specific Operation.	003
11EAC, FAC, 11EBC, FBC, 11ECC, FCC, 11EDC, FDC	Wing Access Panels for Loose (730) or Missing Bolts, Screws, and Rivets (106).	030
11JN1	Visible High Pressure Hose and Tubing for Kinks (780), Flat Spots (780), Damage and Security.	005
11KK1	Canopy Power Package for Damage (108) Security (030) and Leakage (381).	005
11---	*External Tank Support Beam NDI Inspection.	045
12A-- , 12AA1, 12AE1, AF1	Instrument Panels, Brackets, and Fasteners for Damage and Security (730).	010
12B-- , 12BA1, 12BP1	Ejection Seat for Cleanliness (230), Breaks (070) Cracks (190), Damage and Security (730), Corrosion (170). High Pressure Hose for Kinks (780), Flat Spots (780), Damage and Security (730).	015
13AAA, 13AAH	Main Gear Shock Strut and Outer Cylinder for Corrosion, Cracks (190), Wear (020), Distortion (780), Security (730) and Leakage (381). Outer Cylinder Pivot Beam Attaching Lugs for Cracks (190).	015
13AAC	Main Gear Drag Brace for Corrosion Cracks (190), Wear (020), Distortion (780) and Security (730).	003 LH 003 RH

WUCs	DESCRIPTION	MAN TIME (min)
13AG1	Main Gear Fairing and Linkage for Corrosion, Cracks (190), Wear (020), Distortion (780), and Security (730).	003 LH 003 RH
13AE1	Main Gear Door Pickups and Fittings for Corrosion, Cracks (190), Wear (020), Distortion (780), and Security.	010 LH 010 RH
13E---	*Main Landing Gear Position Control and Lock Switches for Corrosion and Damage. Switch Rollers for Excessive wear (020) and Plungers for Free Operation (Audible Click). Switches for Proper Adjustment (127) and Electrical Connections for Security. Parallel Indicating and Control Circuits for Continuity in A/W T.O. IF-106A-2-8.	075
13E---	*Nose Landing Gear Position Control and Lock Switches for Corrosion and Damage. Switch Rollers for Excessive Wear (020) and Plungers for Free Operation (Audible Click). Switches for Proper Adjustment (127) and Electrical Connections for Security. Parallel Indicating and Control Circuits for Continuity in A/W T.O. IF-106A-2-8.	045
13AE1	Main Gear Door and Fairing for Aerodynamic Smoothness, Cleanliness (230), Dents (780), Cracks (190), Wear (020), Distortion (780), Loose Bolts or Rivets (105) and Security (730).	010 LH 010 RH
13AH1	Nose Landing Gear Door for Aerodynamic Smoothness, Cleanliness (230) Dents (780), Cracks (190), Wear (020), Distortion (780), Loose Bolts and Rivets (105) and Security (730).	010
13---, 13H00	*Landing Gear for Specific Emergency Extend Operation by Assuring Freedom of Movement (135), and Positive Operation of Locks (Landing Gear Hydraulic System Bled of Air After Emergency Operation in A/W TO 1F-106A-2-8).	075
13DH1	Brake Relay Valve Vent Seals for Security (730).	010
13DH1	Brake Hydraulic Lines and Relay Valve for Leakage (381) with Pedals Depressed.	005
13DH1	Brakes for Specific Air Pressure at Wheel Brake Assemblies with Pedals Depressed.	015 LH 015 RH
13DG1	Brake Master Cylinder for Specified Fluid Level, Leakage (381) and Security (730).	010
13DE1	Brake Automatic Adjuster Pins for Extension Beyond Specified Minimum Length (15/32 Inch Minimum Distance Between the Outer Face of Washer Under Adjustment Pin Nut and Outer Face of Adjustment Clamp Retaining Washer). Inspect Brake Stators, Rotors, Pressure and Backing Plates and Carriers for Cracks (190), Wear (020), Distortion (780) and Corrosion.	005 RH 005 LH

WUCs	DESCRIPTION	MAN TIME (min)
13DJ1	Brake Reservoir for Specific Fluid Level, Leakage (381) and Security (730).	005
14FA1, FC1	Rudder Actuator Control Valve and Hose for Leakage (381).	020
14JF1	*Speed Brake Door Actuator Attaching Point for Cracks (190), Door Actuator Rod End for Cracks (190), and Door Actuator Rod End Bolts for Damage and Cracks (190). (NDI I/A/W TO 1F-106A-36)	025
14JQ1, JH1, JR1, JF1, JC1, JE1, JD1	Speed Brake Actuators, Selector Valve, Lines, Hoses, Tubing, and Connections for Leakage (381), Chafing (020) and Security (730). (Drag Chute Enclosure Removed.)	020
14J--	Speed Brakes for Specified Operation.	060
14JK1	Speed Brake Limit Switches for Specific Operation and Security (730).	010
14CG1	Elevon Leading Edge Drain Holes for Obstructions.	003 LH 003 RH
14DD1, DE1	Elevon Actuator for Leakage (381).	005 LH 005 RH
14C00, CA1, CD1	Elevon Mechanism Bearings, Bellcranks, Torque Tubes, and Linkage for Cleanliness (230), Cracks (190), Distortion (780), Evidence of Wear (020) or Binding (135), Clearance (127), and Security (730).	005 LH 005 RH
14GA1	Aileron Trim Actuator for Security (730) and Rod End Play.	004
14DA1, DB1, DC1	Elevon Hydraulic Control Valves (HEP) for Leakage (381) and Specific Operation.	015
14CG1	Honeycomb Structure of Elevon Trailing Edge for Delamination of Edges (846). Bulging (780) and Evidence of Interior Delamination (Audibly by Tapping).	010
14CG1	Elevon for Crack (190), Dents (780), Abrasions (935), Loose Rivets (105) Excessive Play and Aerodynamic Smoothness.	020
23MVO	*Calibrate Engine Oil Quantity System.	060
23NQA	Throttle Quadrant and Accessible Linkage Age and Security (730).	003
23NQA	Accessible Throttle Linkage for Damage, and Security (730), Torque Tube Crossover (Airframe to Engine for Cracks (190).	006
23QR-, QS-	Variable Ramp System Hydraulic and Pneumatic Vents for Obstructions.	030
23QTE	Variable Ramp Pitot-Static Head for Cracks (190) in Radius of "L" and Ports for Obstructions.	030

WUCs	DESCRIPTION	MAN TIME (min)
23SR-	Constant-Speed Drive Oil Tank and Accessible Components Including Constant-Speed Drive Oil Cooler, for Evidence of Leakage (381).	003
23---	Engine Vents and Breather Openings for Obstructions and for Evidence of Excessive Drainage.	001
23---	*Trim Engine	045
23---	Engine Drain Lines for Obstructions.	001
23---	Engine Mounted and Remote Constant-Speed Drive Unit Drains for Freedom from Obstruction and Evidence of Excessive Drainage (381).	003
23SQ-, SQA, SQB, SQN	Constant-Speed Remote Drive Unit and Power Takeoff Shaft for Damage and Security (730).	002
23KQ-	*Oil Drained From Starter and Magnetic Plugs for Metal Particles (372).	005
23KQ-	Starter Adapter Case Seals for Excessive Leakage (381).	001
23KQ-	Starter and Starter Components, Ducts, Tubing, and Electrical Connections for Damage and Security.	002
23QTE	Variable Ramp Pitot Head Anti-Ice System Heater for Operation (Note Temperature Rise).	007
23QT-	*Variable Ramp Pitot-Static System Leakage Test Performed.	060
23QT-, QTA	*Variable Ramp System for Specified Operation. (Normal and Emergency) (Ref TO 1F-106A-2-4).	120
23HAD	Engine Main Fuel Control for Security (730), Electrical Connections for Cleanliness (230) Damage and Security (730).	020
41---, DE, EA1	Accessible Bleed Air, Air Conditioning and Pressurization Ducts, Tubing and Hose for Chafing (020) Damage and Security (730).	008
41A--	Moisture Separator Drains for Obstructions.	003
41A--, AD1, AC1	Refrigeration Unit and Components for Damage, Security (730) and Evidence of Leakage (381).	008
41A--, AC1, AD1	Refrigeration Unit for Specified Servicing.	002
41DFA	Moisture Separator Coalescer Removed, Cleaned and Reinstalled.	060
41---, BF1	*Bleed Air Ejection System for Specified Operation.	005
41FA1	Seal at Fuselage-to-Canopy Connection for Deterioration (117) and Security (730). Canopy Pressure Seal for Damage, Deterioration (117) and Security (730).	010
41AE1	Pressure Regulator and Shutoff Valve Solenoid for Damage and Security (730).	002
42---	Generator Brushes for Excessive Wear (720) and Carbon Dust. (Ref. 1F-106A-2-10).	050

WUCs	DESCRIPTION	MAN TIME (min)
42---,AG1	Generator Harness for Damage, Security (730), and Deterioration (117).	005
42---,C00,DA1, A--,DB1	Generators for Specified Operation (Using Electrical Load Bank Unit 1/A/W to 1F-106A-2-10).	030
42F---	*Air Turbine Drive Magnetic Plug for Contamination.	005
42F--,FB1	*Air Turbine Motor Generator for Specified Operation.	005
42CG1	AC Exciter Regulator, Electrical Connections and/or Connector Plug for Cleanliness (230), Damage and Security (730).	004
42---	Generators for Damage, Security (730), and Evidence of Oil Leakage (381).	005
42---	Generator Brushes for Excessive Wear (720) (Ref. T.O. 1F-106A-2-10).	035
42---	Generator Purging Air and Electrical Connections for Security (730).	005
42---	Generator Harness for Damage and Security (730).	005
42FG1	*Air Turbine Generator Harness and Connections for Damage and Security (730).	005
42B--,42EG1	Emergency D-C System for Specified Operation.	015
42E00,EA1	*Hydraulic Motor Driven Emergency A-C System for Specified Operation.	015
42E--,EC1	Emergency A-C Generator Drive Assembly Gear Box Drained and Reserviced. Shaft Seals for Leakage (381) (Shaft Seal Drain Plugs Removed and Accumulated Oil Drained). Hydraulic Motor for Leakage (381).	030
45EE1	*Accessible Area of Air Flask for Gouges and Scratches (935) Beyond Specified Limits	010
45E00	*High-Pressure Pneumatic System Functional Test and Leak Check Performed.	050
45E00	Pneumatic System Recharged (Minimum 3000 psi).	050
45---,AF1,AK1, A00,BG1,BK1, B00,BS1	Primary and Secondary Hydraulic Units, Valves, Lines Hose and Connections for Deterioration (117), Leaks (381), Cuts (116), Dents (780), Chafing (020) and Security (730), Hose and Line Fitting Nuts, Sockets and Sleeves for Cracks (190).	010
45E--,EM1	Pneumatic Units, Lines, Hose and Connections for Leakage (381), Deterioration (117), Cuts (116), Dents (780), Chafing (020) and Security (730). Hose and Line Fitting Nuts, Sockets and Sleeves for Cracks (190).	010
45CB1	RAM Air Turbine Door Honeycomb Structure for Delamination (846) at Edges, Bulging (780) and Evidence of Interior Deterioration (117) (Audibly by Tapping).	010
45---	Primary and Secondary Hydraulic Systems for Contamination (230) Beyond Specified Limits.	030

WUCs	DESCRIPTION	MAN TIME (min)
45CB1	RAM Air Turbine Door, Hinge, Rod and Mount for Cracks (190) and Loose Rivets. Door Seal for Proper Installation and Deterioration.	010
46---	Accessible Fuel System Components for Cracks (190), Dents (780), Chafing (020) and Security (730).	010
46J--, JA1	Accessible Aerial Refueling Components in Refrigeration Compartment for Evidence of Fuel or Hydraulic Leakage (381).	010
46C--, CA1, CB1	Fuel System Tank Vent and Pressure Relief Valve for Evidence of Leakage (381).	005
46---, CP1, CK1	*Fuel System for Specified Operation, Using Fuel System Test Stand, Part Number 8-96199.	240
46H--, HC1	External Fuel System Pylon Assembly for Loose (105) or Missing (106) Hardware and ground Receptacle for Damage and Security.	010
46---, HAC	*External Fuel Tank Fuel and Pressurization Line Quick Disconnect Coupling Seals for Damage and Deterioration (117). Coupling for Obstructions.	060
46P--, PE1	Fuel Flow Equalizer Pressure Switch for Cracks (190) and Leakage (381)(Particularly Around Electrical Connection) Lines and Connections for Leakage (381) and Security (730).	010
46G--	*Calibrate Fuel Quantity System	030
47AA1, A--	Oxygen Converter Assembly for Security (730). Connection Fittings at Hookup Panel for Cracks (190).	005
49AM1	Fire and Overheat Detector System Wiring Damage, Kinks, Chafing and Security (730).	020
51FC1	Pitot Boom for Damage and Security (730).	005
51E00	Attitude Indicating System for Specified Operation.	020
74---	Missile Transmitter Tuning Loop Checks in Accordance with TO 1F-106A-2-27-2. (After Replacement of RTM Hydraulic Filter Element and System Bled and Purged).	030
75D00 75DAJ	Launcher Displacement Assemblies for Deterioration (117), Cleanliness (230), Damage Security (730) and Paint for Deterioration (117).	005
75D00	Launcher Displacement Aft Uplatch Assys for Cracks (190), Damage, Wear (020) and Security (730).	005
75D00	Launcher Displacement Aft Uplatch Assys for Specified Adjustment (127).	025
75B00, 75BD1, BE1, BF1, BJ1	Pressure and Electrically Operated Door Selector Valves for Damage, Security (730) and Safetying.	010

MAJOR INSPECTION

These requirements are performed every 400 flight hours.

WUCs	DESCRIPTION	MAN TIME (min)
11HA1, JA1, HAA, HAB, JAA, JAB, JAC, JAD, JAE, JAF	Windshield and Canopy for Scratches (935), Cracks (190), Crazing (605), Discoloration (117), Delamination (846) Beyond Specified Limits, Leaks (381), Loose Rivets or Bolts (105), and Security (730).	005
11J-- , JL1, JR1	Canopy Release Mechanism and Latches for Specific Adjustment (127), Security (730) and Positive Engagement in the Locked Position.	015
11J-- , JA1	Canopy Fittings and Hinges for Cracks (190), Wear (020) and Security (730).	005
11JM1	Canopy Shear Bolts and Pins for Wear (020) and Cracks (190) (Magnetic Particle Method), and Adequate Lubrication (410) (Shear Bolts Removed)	015
11JA-	Drain Holes in Canopy for Obstructions	003
11E-- , 11ECK, 11F--	Wing Trailing Edge and Elevon Horn Fairing Drain Holes for Obstructions (230).	003 RH 003 LH
11E---	Wing Hoist Fitting Extended and Lubricated.	020
11---	Main Wheel Well Area for Cracks (190), Corrosion Distortion and Evidence of Structure Failure.	010 RH 010 LH
11---	Exterior Finish for Deterioration and Aerodynamic Smoothness and Stencils, Decals, and Insignia for Legibility (117).	010
11DD-	Fuselage Hoist Attach Fitting Removed and Lubricated.	020
11---	Drain Holes in Bottom of Fuselage for Obstructions (230).	005
11E-- , 11F--	Bulkheads, Belt Frames, Stiffeners, Angles, and Gussets for Cracks (190) in Area of Flange Radii and Attachment Points.	060
11---	Inspect for Cracks Sta 431 Bulkhead.	010
11---	Nose Wheel Well Area for Cracks (190) Corrosion, Distortion and Evidence of Structure Failure.	010
11EAD, EDD, FAD, FDD	Leading Edge of Wing for Aerodynamic Smoothness, Dents (780), Cracks (190) and Freedom from Foreign Material (230).	020 LH 020 RH
11---	External Fuel Tank Support Beams for Cracks (190), (NDI I/A/W TO 1F-106A-36), Corrosion, Damage and Security (730).	030
11--- , DDD, JB1	Fuselage Fairings and Panels for Cracks (190), and Hinges, Fasteners and Latches for Cracks (190), Wear (020), and Security (730).	030
11---	Missile Bay Area for Cleanliness (230) (All Doors Removed).	030

WUCs	DESCRIPTION	MAN TIME (min)
11---	Inspect All Access Doors and Panels for Sealing IAW 1F-106A-2-2 Sect. 6.	045
11GA-, GAE	Vertical Stabilizer for Aerodynamic Smoothness, Cracks (190), Dents (780), Buckles (780) and Loose (105) or Missing (106) Bolts, Screws, and Rivets.	020
11G--	Inspect Access Panels for Sealing IAW 1F-106A-2-2.	010
11J---	Canopy system High-Pressure Hose and Tubing For Damage, Security (730) Kinks and Flat Spots.	015
11HA-	Windshield Rain Seal for Damage, Deterioration (117), and Security (730).	005
11GAF, GAG (14ENI)	Rudder and Vertical Tip Honeycomb Structure for Delamination at Edge (846) for Bulging (780) and for Evidence of Interior Delamination (846) (Audibly by Tapping).	030
11KK1	Canopy Power Package for Damage and Security (730).	002
12BB1	Ejection Seat Rail for Corrosion (170), Damage and Security (730).	010
12B--	Ejection Seat Operational Check IAW 1F-106A-2-2.	240
12BW1	Disconnect for Breaks (070) and Improper Adjustment/Alignment (127).	010
13AAD	Main Gear Side Brace for Corrosion, Cracks (190), Wear (020), Distortion (780) and Security (730).	005 LH 005 RH
13AAA	Main Gear Shock Strut for Cracks (190) at all Attaching Points.	010 LH 010 RH
13ACA	Nose Gear Drag Brace and Attach Filling for Corrosion Cracks (190), Wear (020), Distortion (780) and Security (730).	005
13AH1	Nose Gear Door Seal for Deterioration (117) or Damage.	010
13AH1, AJ1, BD1, BF1	Nose Gear Door Linkage and Actuating Cylinder for Smooth Operation, Synchronization, Clearance (127), and Flush Fit in Up Position (127) (Operational Check).	015
13AE1, BE1, GE1	Main Gear Doors and Fairing for Smooth Operation, Synchronization, Clearance (127) and Flush Fit in Up Position (127). (Operational Check.)	015 LH 015 RH
13AAC	Drag Brace Tie Down Lugs for Cracks (190). (Fluorescent Penetration Method).	015 LH 015 RH
13AF1	Main Gear Door Spring Tubes for Evidence of Excessive Galling (020), Drain Hole for Obstructions.	010 LH 010 RH
13AAF	Main Gear Down-Lock Mechanism for Cleanliness, Cracks (190), Distortion (780) and Security (730).	005 LH 005 RH
13AAA	Main Gear Shock Strut Hydraulic Fluid Drained (Piston Removed to Complete Drainage). Accessible Internal Area of Outer Cylinder for Corrosion and	240

WUCs	DESCRIPTION	MAN TIME (min)
13AAA (Continued)	Damage. Polished Surface of Piston for Scratches (935), Distortion (780) and Cleanliness (230) (Cure Date Components Replaced).	
13DE1	Remove Bolt and Pin Assembly and Inspect Drive Sleeve Bolts (Using Magnetic Particle Method) for Crack In Flange Area (A/W TO 1F-106A-2-8).	010 LH 010 RH
13C---, C00, CC1	Nose Wheel Steering for Specified Adjustment and Operation (127).	080
13DB1	Nose Wheel Visually for Cracks (190) Distortion (780) and Evidence of Damage.	010
13DD1	Nose Gear Tire for Uneven Tread Wear (020), Flat Spots, Cuts (116) Blisters and Evidence of Tread Separation (782).	010
13DA1	Main Wheel Visually for Cracks (190) Evidence of Damage, Distortion (780) and Evidence of Overheating (900) Adjacent to Brakes.	005 LH 005 RH
13DC1	Tire for Uneven Tread Wear (020) Flat Spots, Cuts (116), Blisters, Freedom From Fuel, Grease or Oil (230) Evidence of Tread Separation and Overheating (900).	005 LH 005 RH
13EE1, EEA, E00	Landing Gear Safety and Limit Switches for Adjustment (127), Alignment (127) and Operation.	040
14JB1	Speed Brake Hinges and Fittings for Binding (135), Clearance Between Door Nodes and Base of Hinge Cavities Throughout Complete Range of Door Travel (Full Open and Full Closed Position), and Evidence of Movement Between Fitting and Fuselage Skin.	005
14JA1	Speed Brake Doors for Cracks (190), Corrosion, Distortion (780), Aerodynamic Smoothness, Loose or Missing Rivets (105), Nodes and Adjacent 4" Area (From Center of Pin Hole) for Cracks (190) (Fluorescent Penetrant Method) (Doors Removed).	020
14JB1	Upper Speed Brake Hinge Fitting for Cracks (190) (Fluorescent Penetrant Method).	010
14JA1	Speed Brake Door Bushing for Wear (020) and Elongation.	003
14JB1	Upper Speed Brake Hinge Bushing for Wear (020) and Elongation .	003
14JA1	Speed Brake Door Seals for Damage and Security (730).	003
14JE1	Speed Brake Relief Valve for Specified Operation (Remove and Bench Check I/A/W TO 9HA -2-120-3).	060
14CG1	Sealant Over Tooling Holes in End Closing Rib of Elevon Trailing Edge for Damage and Security (730) (Elevon Structure Link Access Plate Removed).	010

WUCs	DESCRIPTION	MAN TIME (min)
14CH1, CJ1	Control Stick Assembly Retaining Nuts, Screws, and Grip Assembly for Security (730) and for Adequate Clearance (127) from Adjacent Components.	010
14CH1, CJ1	Control Stick Assembly for Freedom of Operation, No Sticking or Binding Particularly in Lower Mechanism Connection in Lower Base Assembly. Proper Routing of Electrical Wiring Harness (1F-106A-2-7).	020
14---	Flight Control System Checkout for Looseness or Face Play and For Specified Rigging (127) (Using Rigging Pins).	360
14---	Artificial Feel Force System for Specified Operation.	120
14---	Flight Control System for Specified Operation (Including AFCS).	020
14CC1, CCA, CCB	Flight Control Mixer Assembly Cover for Damage and Adequate Clearance and Assembly and Immediate Area for Foreign Objects (230).	010
14HA1, HD1	Feel Force Cylinder Regulator Inspection Shaft for Specified Position (127), and Feel Force Regulator for Evidence of Excessive Movement (730) and Shock Mounts for Deterioration (117).	010
14---, A--, AA1, AB1, CC1, CD1, B--	<p>Flight Control System Forward of Station 561 for the Following:</p> <ul style="list-style-type: none"> A. Mechanism, Bearings, Bellcranks, Torque Tubes, Pressure Bellows, Magnetic Stick Damper and Linkage for Cleanliness (230), Cracks (190), Distortion (780), Evidence of Wear (020) Excessive Free Play (730) or Binding (135), Security (730), and Clearance (127). B. Control Rods for Chafing (020) (Particularly at Station (220). C. Mixer Assembly and Components for Cleanliness (230), Cracks (190), Distortion (780), Evidence of Wear (020), Binding (135), Clearance (127), Security (730) and Damage. D. Electrical Wiring in Immediate Area of Mixer Assembly for Chafing (020) and Security (730). E. Riveted Bellcrank Ends on Each End of Left and Right Torque Tube for Looseness, Sheared Rivets or Evidence of Movement on Tube. F. Rudder Cable Pressure Seals for Deterioration. 	100

WUCs	DESCRIPTION	MAN TIME (min)
14GC1	Rudder Trim Actuator for Security (730) and Rod End Play.	003
14GB1	Elevator Trim Actuator for Security (730) and Rod End Play.	003
14EN1	Rudder for Excessive Play.	010
14---, CD1	Flight Control System Aft of Station 561 for the Following: A. RH and LH Elevon Control Rods for Loose Bearings (730), Excessive Free Play (730), Distortion and for Evidence of Chafing (020) and Interference (127). B. RH and LH Elevon Control Rod End Bearing and Rod End Fittings for Loose Rivets (105) and Movement In Rod End. C. RH and LH Elevon Follow-Up Bellcrank Assemblies for Loose (730) and Worn (020) Bushings, Bushings for Proper Fit Against Inner Race of Rod End Bearings (127) and Bolts for Proper Length (No Interference with Inboard Elevon Horns). D. RH and LH Hydraulic Elevon Control Valve for Leakage (381), Input Rods for Loose Bearings (730), Excessive Free Play (730), Distortion (780) and for Evidence of Chafing (020) and Interference. E. RH and LH Hydraulic Elevon Control Valve Bellcranks for Free Play Indicating Worn Bearings. Rod End Bearings and Rod End Fittings for Loose Rivets and Movement in Tube.	030
14FA1	Rudder Control Valve Input Rod for Loose (730) Bearings.	010
14HG1, HH1	Artificial Feel System Intake Ports for Damage and Obstructions.	005
14EN1	Rudder Surface for Aerodynamic Smoothness, Cracks (190), Dents (780), and Loose Rivets (105).	020
14EN1	Sealant Over Tooling Holes in Upper and Lower Closing Rib of Rudder for Damage.	005
14E--, EC1, EJ1	Rudder Pedal Installation Mechanism, Bearings, Bellcranks, Torque Tubes, and Linkage for Cleanliness (230), Corrosion, Cracks (190) Distortion (780) Evidence of Wear (020), Excessive Free Play or Binding, Clearance, Security (730) Chafing (020) Restriction or Foreign Objects (Move Pedals Through Complete Range of Travel).	040
23J--, JAB, JAF	Engine Oil Tank and Accessible Components, Including Fuel-Oil and Air-Oil Coolers for Evidence of Leakage (381).	005
23JAK	Engine Oil Strainer Element for Contamination (230), Metal or Neoprene Particles (Clean Filter Element Installed).	008

WUCs	DESCRIPTION	MAN TIME (min)
23NQA	Throttle Quadrant and Internal Mechanism for Damage, Security and Presence of Foreign Objects. Irresistable Lock Mechanism "C" Blocks for Cracks, Sector for Gaulding, Clean and Relubricate Locking Mechanism, Handle for Free Play. Electrical Components for Specified Operation (Quadrant Removed).	055
23QSA	Accessible area of Variable Ramp Pneumatic Air Flask for Gouges and Scratches Beyond Specified Limits and Fuel and Oil Contamination (230).	015
23Q--	Variable Ramp Screw Jacks for Damage and Security (730).	070
23Q--	Variable Ramp Shaft Drive Gear Box for Damage and Security (730).	040
23Q--	Variable Ramp Connecting Flex Shafts for Damage and Security (730).	070
23QQ-	Variable Ramp Crossover Flex Shaft for Security.	040
23QT-	Variable Ramp Pitot-Static System Water Drains for Condensation (Caps Replaced).	010
23QT-	Variable Ramp Seal System for Specified Operation.	060
23SQA, S00	Remote Mounted Constant Speed Drive Unit for Oil Leaks (381), Cracks (190), or Damage, and Mounting Studs, Nuts, and Pins for Security (730).	006
23SQL	Remote Mounted Constant Speed Drive Oil System Filter for Metal Particles (230), Element for Contamination (230) (Clean Filter Installed).	030
23JQ-, JQA, SRE	Engine Air Oil Cooler Components for Specified Operations I/A/W TO 1F-106A-2-4.	030
41---, AG1, CB1, AH1, C00	Cockpit Heating and Ventilating System for Operation Through Temperature Control Range.	015
41--	Windshield Rain Clearing, Anti-Ice, and Canopy Defog System for Proper Operation.	015
41LA1	Engine Inlet Duct Lip Anti-Ice Valve for Specified Operation.	015
41NAC, NAA	Rain Clearing System Ducts for Damage, Connections and Clamps for Security (730). Outlets for Obstructions.	005
41--, AC1, AD1	Refrigeration Unit Flexible Couplings for Cracks (190) and Damage.	005
41A--, AC1, AD1	Refrigeration Unit Attaching Flanges and Mounting Brackets for Evidence of Structural Failure.	005
41---, AC1	Refrigeration Unit Ducts, Clamps, and Sensing Lines for Cracks (190), Dents (780) and Security (730).	005

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GENERAL DYNAMICS SAN DIEGO CALIF CONVAIR AEROSPACE DIV F/G 1/3
F-106 SCHEDULED MAINTENANCE STUDY. PHASE III. PREDICTIONS AND R--ETC(U)
SEP 72 L J BROWN, K E MARKS, G WANG
6DCA-AHD72-005 F41608-71-D-1383

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WUCs	DESCRIPTION	MAN TIME (min)
41A--, AC1, AD1	Refrigeration Unit Valves and Connections for Damage and Security (730).	003
41A--, AC1, AD1	Air Cycling Machine Unit Nozzle Actuator Shaft for Free Operation and Specified Stroke (127).	005
41A--	Cockpit Temperature Control System for Specified Operation	060
41---	Emergency Cockpit Pressurization and Low Pressure Warning System for Specified Operation.	060
41---	Cockpit Pressure and Leak Test IAW 1F-106A-2-6.	060
41---, D00	Electronic Cooling, Overheat Warning (BTU Sensor) System for Specified Operation.	060
41AA1	Heat Exchanger for Cracks (190) and Damage.	005
42BE1	DC Control Panel, Electrical Connections and/or Connector Plug for Cleanliness (230), Damage and Security (730).	003
42CD1	AC Control Panel, Electrical Connections and/or Connector Plug for Cleanliness (230), Damage and Security (730).	003
42EC1	Emergency A/C Generator Electrical Connections for Security (730).	005
42---	Electrical System, from Generating Source to Each Electrical Component (Excluding Instruments, Radio Radar, and Armament Wiring) from Main Power Buses to Operating Units for the Following: A. Accessible Wiring for Deterioration (117), Chafing (020) Fraying (020), Specified Support (730), and Evidence of Overheating (900).	180
42A--, AL1	Fuse Panel Covers for Damage and Security (730).	010
42F--, FJ1	Air Turbine Generator Ducts and Valves for Security (730) Chafing (020), Cracks (190) and Evidence of Heat Damage (900).	
45AC1, AG1, AJ1, BC1, BG1, BJ1, JF1, JR1	Hydraulic Filters for Damage and Security (730).	060
45EBA	High-Pressure Pneumatic Inlet Line Filter Element for Contamination (230) (Clean Element Installed).	020
45E--	High-Pressure Pneumatic Supply System Purged.	070
45AF1, BF1	Primary and Secondary Hydraulic Pumps Bench Checked. (Ref. TO 9H4-2-36-63).	030
45CA1	Ram Air Turbine for Extension.	005
45CA1	Ram Air Turbine for Proper Rotation.	005

WUCs	DESCRIPTION	MAN TIME (min)
45CC1	Ram Air Turbine Door Actuator for Proper Adjustment (127) and Rod End for Elongation (020) and Excessive End Play (730).	010
45CA-	Emergency Hydraulic Pump, Pump Connections and Lines for Leakage (381), Chafing (020) and Security (730).	012
45---, ATA	Primary and Secondary Hydraulic Units, Lines, and Connections for Leakage (381) Under System Pressure.	010
45JC1	Rapid Tune Megnetron Hydraulic Pump for Leakage (381) and Damage and Security (730).	040
45CF1	Ram Air Turbine Flow Control Valve Removed and Bench Checked.	050
45D--, DA1	Hydraulic Pressure Indicating System for Separation by Comparing Pilot's Primary and Secondary Pressure Indicators and Accumulator Gages with Pressure Indicators.	010
46J--	Aerial Refueling System for Specified Operation.	060
46CH1	Fuel Tank Pressurization System (Engine Bleed Air Filter) for Contamination (230) and Damage (Clean Filter(s) Installed).	030
46Q--, QA1, QB1, QC1	Fuel System Shutoff Valve Switches Actuated to Open Position. Valves and Position Indicator Lights for Specified Operation.	005
46JAC	Aerial Refueling Slipway Door Actuator Boot for Damage, Deterioration (117) and Security (730).	010
46C00, CH1	Fuel Tank Pressurization System (Engine Bleed Air Filter) For Contamination (230) and Damage (Clean Filter(s) Installed).	030
46NC1	Fuel Flow Equalizer for Damage and Security (730).	005
46---	Fuel System Components, Lines, and Connections for Leakage (381) and Security (730) (Fuel Pressure On). Fuel System Shut-off Valve for Security (730) and Evidence of Leakage (381).	015
46NA1	Engine Fuel Supply Screen for Contamination (230) Damage and Security (730), Screen End Plates for Cracks (190) (Clean Screen Installed).	020
46A--, AA1	Ground Refueling Receptacle and Cap for Damage and Security and Receptacle for Proper Alignment.	005
46C--, CA1, CB1, CE1, CF1, CG1	Fuel Quantity Indicating System for Correct Capacitance and Indicators for Calibration (Tanks Empty).	150
46S--, SA1, SB1	Fuel System Test Stand Receptacles and Defuel Valve for Damage and Security.	005
47AD1	Oxygen Filler Door for Damage and Security (730).	005
47AAA	Oxygen Converter Pressure Valve for Damage and Security.	004

WUCs	DESCRIPTION	MAN TIME (min)
47C--, CA1	Pilots Oxygen Supply System Components for Damage, Personal Leads for No Kinks or Sharp Bends, Connections for Damage	005
47---	Oxygen System Purged IAW IF-106A-2-6.	030
47---	Oxygen System Components for Cleanliness (230), Freedom from Oil and Grease, Mounting Brackets for Cracks (190) and Pages for Calibration.	005
49AAA, AAB, AD1, AE1	Fire and Overheat Detector System for Specified Operation (Actuate Test Switch).	005
51FD1	Pitot-Static Head for Damage and Security (730).	010
51AC1, DB1	Air Speed Indicator(s) for Calibration at Every Major Graduation Within the Speed Range of the Aircraft.	060
51F--	Pitot and Static Parts for Obstruction.	005
51AD1, DE1	Altimeters for Readings within Specified Tolerance, Pointers for Smooth Movement (037) and Evidence of Friction.	040
51---	Pitot Static System Disconnected at Instruments. Pressure-Ratio-Altitude Switch and Air Data Computer Unit Drains Opened and Lines Cleaned with Dry Low Pressure Air. System Leak Tested.	060
51---, 51D--	Electrically Operated Indicating and Gyro Instruments for Operation.	020
51EA1	Attitude Direction Indicator Bench Checked (Ref. TO F58-3-11-2)	060
51EC1	Displacement Gyro Bench Checked.	090
52---	Conduct AFSC Operational Check I/A/W/ TO 1F-106A-6WC-4-1.	
74---	Fire Control Electrical Systems for the Following, From Each Electrical Component To, But Not Including Main Power Buses: Accessible Connector Plug Exteriors for Security (730), Cracks (190) and Evidence of Overheating. Accessible Potted Electrical Connectors for Deteriorated (117) or Porous Potting Compound, Compound for Adhesion to Connectors.	030
75K00 75KAG	Missile Launcher Assembly for the Following: A. Anodized Rails, P/N 464054 for Nicks (425), Gouges (935), Corrosion, Cleanliness (230) and Specified Dimensions (Width and Thickness Measurement) in Accordance with TO 1F-106A-2-12. B. Flame Coated Rails, P/N 68C53527, at Forwarded and Aft Missile Hook Locations for Cracks (190), Chips (910) or Separation of Tungsten Carbide Coating (Under 10 Power Magnification).	030

WUCs	DESCRIPTION	MAN TIME (min)
75K00, 75KAG (Continued)	C. Gone Switch for Cracks (190). D. Riveted Housing for Cracks (190). Stripped/Loose (105) Screws, Bolts and Nuts. E. Adequate Lubri-Bond Coating.	
75A00, 75AAA, AFA, ABA, AGA, AB1, AF1, AA1, AG1	Armament Bay Doors for Cleanliness, Cracks (190), Wear (020), Distortion (780), and Loose (105) Bolts and Rivets.	020
75D00, DAJ	Launcher Displacement Assemblies for Deterioration (117) Cleanliness (230), Damage, Security (730), and Paint for Deterioration (117).	005
75G00, GA1	Ejection Rack Assembly for Deterioration (117), Cleanliness (230) Damage and Security (730).	005
75D00 75EAC	Launcher Displacement Assys for Specified Clearance (127) (Dummy Missiles Installed).	060
75000, AAB, AFB, ABB, AGB, AC1, AH1, AD1, AJ1	Armament Bay Door Operating Mechanism and Seals for Damage and Security (730).	010
75000	Weapon Delivery Electrical Systems for the Following (From Each Electrical Component to, But Not Including Main Power Buses: (a) Accessible Wiring for Deterioration (117) Chaffing (020), Fraying (020), Specified Support (730) and Evidence of Overheating (900). (b) Connector Plug Exteriors for Security (730), Cracks (190) and Evidence of Overheating (900). Potted Electrical Connectors for Deterioration (117) or Porous Potting Compound, Compound for Adhesion to Connectors. (c) Wire Shielding for Fraying (020), Crimping (780) and Damage. (d) Plastic Tubing for Specified Drain Holes, Damage and Security. (e) Terminal Strips, Covers, Connectors, Bonding Jumpers, and Ground Connections for Damage and Security (730).	080
75000	Launcher Assemblies for Unrestricted Movement, Proper Clearance (127) and Positive uplatching (127). Harness assemblies for damage and security (730) with Launchers in Retracted and Extended Position.	
75000	Accessible Electrical Components in Armament Bays for Cleanliness (230), Damage, Security (730) and Safetying.	039
75KAB	Missile Launch Hold Back Pins for Shearing (585) Burning (935) and Damage.	005

WUCs	DESCRIPTION	MAN TIME (min)
75BJB	MB-1 Forward Umbilical Plug Cradle Assembly for Security (730), Retainer Spring for Proper Shape (One Deformation).	005
75B00, BG1	Armament Bay Door Pneumatic Lines and Connections for Deterioration (117), Cleanliness (230) Damage and Security (730).	005
75C, 75CF1	Armament Circuits and Components Tested in Accordance with Applicable Maintenance Manual.	020
93A --	Drag Chute Anchor Jaw Mechanism Linkage, Cables, Stops, Electrical Switches and Components for Damage and Security (730).	005
93A--	Drag Chute System Fittings and Brackets for Cracks (190), and Security (730).	003
93A--	Drag Chute System Bolts and Pins for Wear (020) and Security (730).	002
93AK1	Drag Chute System Ripcord Guide Assembly for Bends (780), Cracks (190), or Damage.	002
93A--	Drag Chute Jettison Pin and Receptacle Washers for Specified Retention (730), (PIN for 3 to 12 Pounds Pull). Washers for Damage, Deterioration (117), and Security (730), Jettison PIN for Specified Penetration Into Receptacle (3/4 to 1 Inch).	005
93A--, 93AU1	Drag Chute Pawl Release Lever for Freedom of Movement (135).	003
93AE1	Drag Chute Jaw Mechanism for Wear (020), Damage, Security of Parts, Chafing (230), Binding (780) and Lubrication (410).	005
93A00, 93---	Drag Chute System for Specified Operation (Normal and Emergency System).	005
93A--, 93AM1, 93AN1, 93AP1	Drag Chute Selector Valve and Actuating Cylinder for Leakage (381) and Security (730), Pneumatic Tubing for Damage, Security (730), and Clearance (020) Between Tubing and Adjacent Structure.	010
93AB1	Drag Chute Canister for Cracks (190), Security and Excessive Moisture (230).	004
93AG1	Drag Chute Restraining Strap for Wear, Fraying (020) and Security (105).	005
97AP1	Canopy Actuating Cylinder for Damage and Security (730).	015
97--, AJ1	Canopy Thruster (M3A1 and M3A2) for Cracks (190) (Mounting Bracket Removed).	030
97---, AH1	Canopy Thruster and Initiator for Damage and Security (730).	015
97AA1	Rotary Actuator Webbing for Fraying (Not to Exceed 15 Nylon Strands).	005

CORROSION

These tasks are performed in conjunction with the IRAN package and as directed by using command.

WUCs	DESCRIPTION	MAN TIME (min)
11---	Aircraft Cleaned in Accordance with T.O. 1F-106A-2-2 and T.O. 1-1-1.	240
11---, J--	Canopy Fittings and Hinges for Corrosion.	002
11---, H--, J--	Windshield and Canopy Frame for Corrosion.	002
11---	Fuselage Hoist/Sling Attach Fitting for Corrosion (Plugs Removed) (Lubricate Plugs with MIL-L-8937 Prior to Reinstallation).	005
11---, D--	Exterior of Fuselage Protective Finish for Damage and Deterioration (117). Fuselage for Corrosion.	010
11D--	Engine Inlet Ducts for Corrosion.	020
11---, C---	Fairing, Panels, and Doors, Door Hinges, Fasteners and Latches for Corrosion.	010
11GA-	Vertical Stabilizer for Corrosion, Protective Finish for Damage and Deterioration (117).	002
11---	Accessible Structural Surfaces in Nose Wheel Well Area for Corrosion.	005
11---	Accessible Structural Surfaces for Corrosion	010
11---, E--, F--	Wing Surfaces Including Leading Edges for Corrosion	008
11---, E--, F--	Wing Hoist/Sling Attach Fittings for Corrosion (Plugs Removed) (Lubricate Plugs with MIL-L-8937 Prior to Reinstallation).	006
11---, E--, F--	Accessible Wing Attachment Fittings for Corrosion	002
11---, E--, F--	External Fuel Tank Wing Fitting for Corrosion	002
11---	Interior of Fuselage Protective Finish for Damage and Deterioration. Fuselage for Corrosion.	017
11GA-	Accessible Internal Structure of Vertical Stabilizer for Corrosion.	002
11---	Accessible Frame Structure and Racks in Left Upper Aft Electronic Compartment for Corrosion	002
11---	Accessible Frame Structure and Racks in Left Forward Electronic Compartment for Corrosion	002
11---	Accessible Frame Structure and Racks in Right Aft Electronic Compartment for Corrosion.	002
11---	Accessible Frame Structure and Racks in Right Electronic Compartment for Corrosion.	002

WUCs	DESCRIPTION	MAN TIME (min)
11---	Accessible Frame Structure and Rack in Left Lower Aft Electronic Compartment for Corrosion.	002
11---	Accessible Frame Structure and Racks in Lower Mid-Electronic Compartment for Corrosion, (F-106B only).	002
11---	Accessible Frame Structure in Air Conditioning Compartment for Corrosion, Accessible Tubing, Lines, Connections and Brackets for Corrosion.	015
11---	Accessible Frame Structure in Hydraulic Accessory Compartment for Corrosion. Accessible Tubing, Lines, Connections and Brackets for Corrosion.	005
11---	Accessible Cockpit Structure for Corrosion.	005
11---	Egress System Lines and Connections for Corrosion.	002
11---, D--	Accessible Frame Structure for Corrosion. Particularly in Lower Points and Crevices.	015
11K--, L--	Canopy Actuating System and Uplock Warning System Relays, Switches and Connectors for Corrosion.	005
12BA1	Seat for Corrosion.	005
12BB1	Seat rails for Corrosion.	002
12BZ2	Parachute Pressure Actuator for Corrosion.	002
12---, A--	Cockpit and Fuselage Compartment Components for Corrosion.	005
12B--	Ejection Seat System Components for Corrosion.	002
13J	Tail Hook for Corrosion.	001
13A--	Nose Gear Door Actuating Mechanism for Corrosion	002
13ACC	Nose Gear Down Lock Mechanism for Corrosion.	001
13C--	Nose Wheel Steering Assembly and Components for Corrosion.	002
13ACA	Nose Gear Shock Strut, Linkage and Fittings for Corrosion.	003
13AC1	Nose Gear Accessible Pivot Beam Pins and Bolts for Corrosion.	001
13ACB	Nose Gear Drag Brace for Corrosion.	001
13B--	Nose Gear and Door Actuators for Corrosion.	002
13ACD	Nose Gear Torque Arms for Corrosion.	001
13AH1	Nose Gear Door for Corrosion.	001
13E--	Nose Gear Position and Lock Switches for Corrosion.	002
13---	Accessible Hydraulic and Pneumatic Lines, Connection, and Clamps for Corrosion.	002

WUCs	DESCRIPTION	MAN TIME (min)
13--	Wire Braided Hoses for Corrosion.	001
13AAA	Main Gear Shock Strut for Corrosion.	004
13AA-	Accessible Main Gear Pivot Beam Pin and Bolts for Corrosion.	002
13AAC	Main Gear Drag Brace for Corrosion.	002
13AAD	Main Gear Side Brace for Corrosion.	002
13AAE	Main Gear Torque Arms for Corrosion.	002
13B--	Main Gear and Door Actuator for Corrosion.	002
13A--	Main Gear Door and Fairing for Corrosion.	008
13AG1	Main Gear Fairing Linkages and Fittings for Corrosion.	004
13AA-	Main Gear Door Pickup for Corrosion.	002
13--	Main Gear Door Actuating Mechanism and Door Linkage for Corrosion.	004
13AAF	Main Gear Down Lock Mechanism for Corrosion.	002
13E--	Main Gear Position and Lock Switches for Corrosion.	002
13D--	Brake Hydraulic Lines, Connections and Hose Connections for Corrosion.	002
13G--, H--	Emergency Extension System Components for Corrosion.	005
14H--	Ram Air Q Intakes for Corrosion.	001
14JA1	Speed Brake Doors, Hinges and Hinge Fittings for Corrosion.	002
14J--	Speed Brake Actuators, Lines and Connections for Corrosion.	002
14CG1	Elevon Surface for Corrosion.	002
14FA1	Rudder Actuator and Accessible Lines for Corrosion.	002
14E--	Rudder Pedal Installation Mechanism, Bellcranks, Torque Tubes and Linkage for Corrosion.	005
14---	Flight Control Mechanism, Bellcranks, Torque Tubes, Control Rods and Linkage for Corrosion	015
23QQV	Variable Ramp Assemblies in Each Duct for Corrosion.	004
23QTE	Variable Ramp Inlet Pitot Tube for Corrosion.	001
23Q--	Accessible Variable Ramp Actuators, Lines and Connections for Corrosion.	010
41A--, D--, B--, E--, G--	Air Conditioning and Pressurization and Distribution System Components for Corrosion.	015
41C--	Cockpit Air Conditioning Components for Corrosion.	005
41K--, N--, M-- L--	Ice Control Components for Corrosion.	010

WUCs	DESCRIPTION	MAN TIME (min)
41F-- , P--	Canopy Seal and Anti-Fog System Components for Corrosion .	010
42G--	Battery Cannon Plug Assembly, Battery Rack and Adjacent Area for Corrosion.	005
42---	Electrical System. From Generating Source to Each Electrical Component (Excluding Instruments, Radio, Radar and Armament Wiring) from Main Power Buses to Operating Units for the Following: A. Accessible Wire Shielding for Corrosion. B. Accessible Terminal Strips, Covers, Connectors, Bonding Jumpers, and Ground Connectors for Corrosion.	010
42F--	Air Turbine Drive AC Generator System Components for Corrosion.	010
44--	Lighting System Lights and Connector for Corrosion.	005
45E--	Pneumatic Lines, Connections, Hose Connections and Components for Corrosion.	002
45---	Accessible Hydraulic System Components, Lines and Connections for Corrosion.	010
46---	Accessible fuel and Pressurization System Lines Components, and Connections for Corrosion.	010
46J--	Aerial Refueling Slipway Door and Accessible Attaching Components for Corrosion.	005
46H--	External Fuel Ejection Rack, Hooks, Sway Braces and Feet for Corrosion.	002
46---	Accessible and Refueling System Components, Lines and Connections for Corrosion.	010
46G--	Fuel Quantity Indicating System Lines, Connections and Components for Corrosion.	010
47A	Oxygen Supply System Lines, Connections and Components for Corrosion.	010
49A--	Fire and Overheat Detection System Components and Connectors for Corrosion.	010
49B	Master Warning System Components and Connectors for Corrosion.	005
51F	Pitot Boom and Pitot Static Head for Corrosion.	001
51---	General Flight Instrument Components and Connectors for Corrosion.	010
52---	AFSC Components and Connectors for Corrosion.	010

WUCs	DESCRIPTION	MAN TIME (min)
55A--	Malfunction Analysis and Recording Equipment Components and Connectors for Corrosion.	005
65A--	Upper and Lower IFF Antennas for Corrosion.	001
65---	IFF System Components and Connectors for Corrosion.	005
71---	Radio Navigation Components and Connectors for Corrosion.	010
74---	Fire Control System Components Connectors, Racks and Wiring for Corrosion.	020
75A--	Armament Bay Doors (Exterior) for Corrosion.	002
75E--	Launcher Displacement Actuator and Components for Corrosion.	005
75D--, G--, H-- K--	Launcher Displacement Assembly Components for Corrosion.	005
75---, C--, J--	Launcher Displacement Limit Switches, Connectors, and Components for Corrosion.	005
75A--	Armament Bay Doors and Linkage for Corrosion.	010
75B--	Armament Bay Door Actuators and Components for Corrosion.	005
75---	Accessible Frame Structure in Armament Bay Area for Corrosion.	005
75---	Accessible Tubing and Connections for Corrosion.	005
93A--	Drag Chute System Fittings and Brackets for Corrosion.	005
93A--	Accessible Drag Chute System Tubing for Corrosion.	002
97--	Explosive Devices and Connectors for Corrosion.	010

ENGINE PREP

These activities are performed in conjunction with the 300-hour engine inspection.

WUC	DESCRIPTION	MAN TIME (min)
PREP	Approved Wheel Chocks in Proper Position (Predock).	005
PREP	Landing Gear Ground Safety Lock Pins Installed.	005
PREP	Aircraft Statically Grounded (Predock).	002
PREP	External A-C and D-C Elect Power Source Provided. (Predock).	003
PREP	Master, A-C and D-C Electrical Power Switches Off.	003
PREP	Portable Fire Extinguisher Provided (Predock).	002
PREP	External Fuel Tank Ejection System Deenergized, Tanks Removed.	120
PREP	Necessary Maintenance Stands and Ladders Provided. (Predock).	005
PREP	Canopy Hold-Open Support Assembly Installed When Canopy is Opened.	005
PREP	Arresting Gear Hook Latched and Safety Pin Installed.	005
PREP	Jack Pads Installed.	015
PREP	Tail Cone Removed.	045
PREP	Applicable Panels Removed to Gain Access to Engine Disconnect Points (Disconnect Points Capped or Covered), (Ref to 1F-106A-2-4).	015
PREP	Wing Walks Provided.	005
PREP	Aircraft Jacked and Leveled for Engine Removal and Main Gear Struts Deflated.	080
PREP	Approved Wheel Chocks in Proper Position (Dock).	005
PREP	Aircraft Statically Grounded (Dock).	005
PREP	Portable Fire Extinguisher Provided (Dock).	005
PREP	Necessary Maintenance Stands and Ladders Provided. (Dock).	005
PREP	Speed Brake Door Safety Locks Installed.	010
PREP	Fuses Removed and Reversed in Receptacle (Replace as Required for Individual Checks).	020
PREP	External Ground Heat Source Provided (If Required).	005
PREP	Radome-Canopy Cover, Artificial Feel System Intake Tube Covers, and All Dust Excluder Plugs and Shields Removed.	005
PREP	Air Pressure Gage (0 to 4000 PSI) Provided.	005
PREP	External Air Conditioning Provided (If Required).	005

WUC	DESCRIPTION	MAN TIME (min)
PREP	Level Aircraft for Engine Installation.	060
PREP	Dock Finalization-Equipment Removed.	090
PREP	Preparation (Post-Dock).	180
PREP	Start Engine in Accordance With T. O. 1F-106A-2-4 (Post-Dock).	030
PREP	Shutdown Engine in Accordance with to 1F-106A-2-4.	030
PREP	Fairing, Doors, Panels and Covers Reinstalled.	960
PREP	Jack Pad Assemblies Installed (Dock).	010
PREP	Aircraft Jacked and Leveled (Dock).	030
PREP	High-Pressure Air Compressor Provided.	002
PREP	External A-C and D-C Electrical Power Source Provided. (Dock).	002
PREP	Wing Walks Provided.	001
PREP	Remove Doors, Panels and Covers.	330
PREP	Tail Cone Installed.	100
PREP	Aircraft Jacks and Pad Assemblies Removed.	020
PREP	Main Gear Shock Struts Serviced and Inflated for Gear Check.	010
PREP	Nose Gear Shock Strut Serviced and Inflated for Gear Check.	005
PREP	Primary and Secondary Hydraulic Systems Fluid for Contamination (230) Beyond Specified Limits.	025
PREP	Hydraulic Test Stand Connected to Primary and Secondary System As Required (Dock).	005
PREP	Ram Air Turbine Test Kit Installed for Check Flight. Note: Remove Test Kit After Flight.	060
PREP	Arming Switch in Safe Position and Armament Selector Switch in Vis Ident Position. Armament Safety Switch in Nose Wheel Well in Groundborne Position.	002
PREP	Service High Pressure Pneumatic System to Minimum 1800 PSI.	010
PREP	Manual Door Control Valve Locked in Open Position. Cylinder Safety Locks Installed (When Doors are Open). Launcher Cylinder Safety Locks Installed.	020
PREP	All Armament Removed.	020
PREP	Umbilical Plug Protective Covers Secured in Place Over Exposed Pins.	004
PREP	Armament Safety Switch in Nose Wheel Well in Groundborne Position.	002

WUC	DESCRIPTION	MAN TIME (min)
PREP	Fuel System Shutoff Valve Switch Turned to Off Position (For Engine Removal). Indicator Lights for Illumination. Fuses Reversed.	010
PREP	Canopy and Ejection Seat Ground Safety Pins Installed.	010
PREP	Seat(s) and Canopy Disarmed.	020
PREP	Personal Leads Disconnect Ports Covered.	015
PREP	Arm Pilot Ejection System (Seat and Canopy) Prior to Test Flight.	060
PREP	Engine Removed in Accordance With T.O. 1F106-A-2-4 for Periodic Inspection.	705
PREP	Engine Installed in Accordance With T.O. 1F-106A-2-4.	700
PREP	Engine Center Section Support Assembly, SE1016, Installed.	020
PREP	Fire Seal Adapter Removed.	250
PREP	Combustion Chamber Outer Case and Chamber Weldment Removed.	180
PREP	Combustion Chamber Weldments and Outer Combustion Case Reinstalled.	240
PREP	Fire Seal Adapter Reinstalled.	480
PREP	Engine Center Section Support Assembly Removed.	060
PREP	Turbine Exhaust Section Installed.	120
PREP	Afterburner Rear Duct and Nozzle Assembly Installed.	240
PREP	Shroud Installed.	480
PREP	Engine Shroud Removed.	080
PREP	Afterburner Rear Duct and Nozzle Assembly Removed.	080
PREP	Turbine Exhaust Section Removed.	090

INSPECTION PREP

These requirements are performed in conjunction with each minor or major inspection.

WUC	DESCRIPTION	MAN TIME (min)
PREP	Approved Wheel Chocks in Proper Position (Predock).	005
PREP	Landing Gear Ground Safety Lock Pins Installed.	005
PREP	Aircraft Statically Grounded (Predock).	002
PREP	External A-C and D-C Elect Power Source Provided. (Predock).	003
PREP	Master, A-C and D-C Electrical Power Switches Off.	003
PREP	Portable Fire Extinguisher Provided (Predock).	002
PREP	External Fuel Tank Ejection System Deenergized, Tanks Removed.	120
PREP	Necessary Maintenance Stands and Ladders Provided. (Predock).	005
PREP	Aircraft Cleaned and Corrosion Inspection Accomplished in Accordance with Technical Order 1F-106A-6WC-7.	697
PREP	Canopy Hold-Open Support Assembly Installed When Canopy is Opened.	005
PREP	Arresting Gear Hook Latched and Safety Pin Installed.	005
PREP	Fuel System Test Stand Part No. 8-96199 Provided.	005
PREP	Jack Pads Installed.	015
PREP	Wing Walks Provided.	005
PREP	Approved Wheel Chocks in Proper Position (Dock).	005
PREP	Aircraft Statically Grounded (Dock).	005
PREP	Portable Fire Extinguisher Provided (Dock).	005
PREP	Necessary Maintenance Stands and Ladders Provided. (Dock).	005
PREP	Speed Brake Door Safety Locks Installed.	010
PREP	Fuses Removed and Reversed in Receptacle (Replace as Required for Individual Checks).	020
PREP	External Ground Heat Source Provided (If Required).	005
PREP	Radome-Canopy Cover, Artificial Feel System Intake Tube Covers, and All Dust Excluder Plugs and Shields Removed.	005
PREP	Air Pressure Gage (0 to 4000 PSI) Provided.	005
PREP	External Air Conditioning Provided (If Required).	005
PREP	Jack Aircraft for Landing Gear Check (Dock).	030
PREP	Dock Finalization-Equipment Removed.	090
PREP	Preparation (Post-Dock).	180

WUC	DESCRIPTION	MAN TIME (min)
PREP	Fairing, Doors, Panels and Covers Reinstalled.	960
PREP	Jack Pad Assemblies Installed (Dock).	010
PREP	Aircraft Jacked and Leveled (Dock).	030
PREP	High-Pressure Air Compressor Provided.	002
PREP	Exhaust Gas Temperature Indicating System Tester Provided.	002
PREP	Variable Ramp System Test Equipment Provided.	002
PREP	External A-C and D-C Electrical Power Source Provided. (Dock).	002
PREP	Wing Walks Provided.	001
PREP	Control Surface Protractors and Flight Control System Test Equipment Provided.	001
PREP	Remove Doors, Panels and Covers.	330
PREP	Aircraft Jacks and Pad Assemblies Removed.	020
PREP	Primary and Secondary Hydraulic Systems Fluid for Contamination (230) Beyond Specified Limits.	025
PREP	Hydraulic Test Stand Connected to Primary and Secondary System as Required (Dock).	005
PREP	Arming Switch in Safe Position and Armament Selector Switch in Vis Ident Position. Armament Safety Switch in Nose Wheel Well in Groundborne Position.	002
PREP	Service High Pressure Pneumatic System to Minimum 1800 PSI.	010
PREP	Manual Door Control Valve Locked in Open Position. Cylinder Safety Locks Installed (When Doors are Open). Launcher Cylinder Safety Locks Installed.	020
PREP	Armament Lock Valve in Armt Lock Position When Launchers are Retracted During Missile Bay Area Inspection, Valve in Flight Position for Launcher Operation and Upon Completion of Inspection.	004
PREP	All Armament Removed.	020
PREP	Umbilical Plug Protective Covers Secured in Place Over Exposed Pins.	004
PREP	Aero 7A Rack Removed for Support Beam Inspection.	060
PREP	Armament Safety Switch in Nose Wheel Well in Groundborne Position.	002
PREP	Aero 7A Rack Installed I/A/W to 1F-106A-2-5.	060
PREP	Canopy and Ejection Seat Ground Safety Pins Installed.	010
PREP	Seat(s) and Canopy Disarmed.	020

WUC	DESCRIPTION	MAN TIME (min)
PREP	Seat(s) Removed.	100
PREP	Personal Leads Disconnect Ports Covered.	015
PREP	Seat(s) Installed. Ejection Handles in Full Down Position, Handle Hold Cable for Security.	060

ENGINE INSPECTION

This inspection is performed every 300 engine-operating hours.

WUC	DESCRIPTION	MAN TIME (min)
23---	Interior and Exterior of Nose Cone Fairing for Cracks (190) in Immediate Area of Rivets and Between Rivets.	040
23AA-	Compressor Inlet Guide Vanes for Nicks (425) and Cracks (190).	040
23B--	Visible Compressor Blades and Compressor Stator Vanes for Nicks (425), Cracks (190) and Broken (070) or Missing (750) Blades or Vanes (Using Borescope Inspection Method).	060
23BD-	Tenth Stage Compressor Blades and Tablocks for Damage and Security (730) Using Borescope Part Number PWA 1557.	020
23JAK	Oil Strainer Element for Contaminated (230) Metal or Neoprene Particles (230) (Clean Strainer Element Installed).	020
23PQW	Fire Seal for Cracks (190) and Distortion (780).	010
23DBU	External Area of Combustion Chamber Outer Case for Hot Spots (900) and Cracks (190) (Fluorescent Penetrant Method) (Ref TO 2J-J75-6).	010
23DB-	Combustion Chamber Weldments and Outlet Ducts for Cracks (190), Heat Damage (900), and Buckling (780) Beyond Specified Limits.	110
23DBU	Combustion Chamber Drain Lines and Fittings for Cracks (190) and Security (730).	010
23DB-	Combustion Chamber Drain Packings Part No. 616400, 362239, and 382425, Replaced.	030
23HA-	Fuel Manifold for Cracks (190) and Security (730).	005
23HAC	Fuel Nozzle for Dents (780) and Excessive Carbon Buildup (230).	005
23HAC	Nozzle Air Caps for Cleanliness (730), Distortion (780) or Burning (900).	005
23HAC	Fuel Nozzle Air Swirl Glide for Damage and Security (730).	005
23HA-	Fuel Manifold and Nozzles Pressure and Flow Tested in Accordance with TO 2J-J75-6.	030
23DAC	Vane and Shroud Assembly, 15th Stage for Nicks (425), Cracks (190), Loose (730) or Missing (750) Vanes and Security (730).	020
23EAF	First Stage Nozzle Guide Vanes for Nicks (425), Cracks (190), Dents (780), Distortion (780), Loose (730) or Missing (750) Blades, and Evidence of Overheating (900).	015

WUC	DESCRIPTION	MAN TIME (min)
23EAA	First Stage Turbine Rotor Assembly for Nicks (425), Cracks (190), Dents (780), Distortion (780), Loose (730) or Missing (750) Blades, and Evidence of Overheating (900) (with Special Attention to First Stage Turbine Shroud).	015
23BAL	Final Stage Compressor Blades for Damage.	020
23BA-	Final Stage Compressor Exit Vanes for Damage.	020
23EA-	First and Second Stage Turbine Wheels for Contact with Adjacent Surfaces by Rotating Wheels at Least One Revolution by Hand.	020
23HAJ	Fuel Pressurization and Dump Valve Filter Element for Contamination (230) and Damage (Clean Filter Installed).	040
23HAE	Main Fuel Control Filters for Contamination (230) and Damage (Clean Filters Installed).	040
23HAG	Engine Fuel Pump Filter for Contamination (230) and Damage (Clean Filter Installed).	040
23---	Engine Operational Check in Test Cell in Accordance with TO 2J-J75-6 or TO IF-106A-10.	999 201
23SQM	Engine Mounted Gearbox Removed and Input Spine for Wear and Lubricate with Plastilube No. 3 or equivalent. On Engines with Starter Drive Shafts Incorporating a Center Stud, Remove Starter Drive Coupling P/N 36536 ⁷ , Check for Wear and Lubricate Male and Female Splines with Plastilube No. 3 or Equivalent (Ref TO 2J-J75-6).	060
23SQM	Constant Speed Drive Engine Mounted Gearbox Plug for Metal Particles (Resistance Check) (372).	025
23SQP	Engine Mounted Gearbox Inlet Filter for Metal Particles (230), Element for Contamination (230) (Clean Element Installed).	010
23SQU	Engine Mounted Gearbox Outlet Filter for Metal Particles (230), Element for Contamination (230) (Clean Element Installed).	010
23SR-	Locking Shoulder of Quick Disconnect Coupling on Engine Mounted Gearbox Oil Inlet and Outlet Line for Excessive Wear (020).	015
23SQM	Constant Speed Drive Engine Mounted Gearbox for Oil Leaks (381), Cracks (190), or Damage.	010
23MUA	Tachometer Generator and Electrical Connections for Security (730).	005
23LBA	Engine Anti-icing Valve, Lines and Connections for Damage, Security (730) and Evidence of Leakage (381).	005
23L--	Compressor Bleed Valve Governor External Lines for Security (730).	015

WUC	DESCRIPTION	MAN TIME (min)
23---	<p>Electrical System for the Following from each Electrical Component to Quick Engine Disconnect:</p> <p>A. Accessible Wiring for Deterioration (117), Chafing (020), Fraying (020), Specified Support (730) and Evidence of Overheating (900).</p> <p>B. Connector Plug Exteriors for Security (730), Cracks (190) and Evidence of Overheating (900). Potted Electrical Connector for Deteriorated (117) or Porous Potting Compound. Compound for Adhesion to Connectors.</p> <p>C. Wire Shielding for Fraying (020), Crimping (780), Corrosion and Damage.</p> <p>D. Plastic Tubing for Specified Drain Holes, Damage and Security (730).</p> <p>E. Terminal Strips, Covers, Connectors, Bonding Jumpers and Ground Connections for Damage, Corrosion and Security (730).</p>	045
23LQD	15th Stage Duct Engine Bleed Air Manifold for Cracks (Fluorescent Penetrant Method).	010
23---	Engine Attachment Points Lubrication.	060
23PQP	Engine Shroud for Distortion (780), Cracks (190), Tears (947), Evidence of Overheating (900), and Loose or Missing Rivets (106). Blankets for Tears, Excessive Discoloration (900), and Security (730).	060
23PQ-	Engine Shroud Cooling Air Check Valves Removed and Cleaned. Flappers for Cracks (190), and Freedom of Movement (135) by Pushing Each Valve (4 Each) Open and Assuring Automatic Closing.	060
23PQ-	Engine Shroud Cooling Ducting for Cracks (190), Damage, or Distortion (780).	060
23HBC	Afterburner Igniter Control for Leakage (381) and Security (730).	005
23HBC	Afterburner Igniter Control Connections for Leakage (381) and Security (730).	005
23HBD	Afterburner Igniter Control Inlet Air Line Screen for Contamination (230) and Damage (Clean Screen Installed).	015
23HBB	Afterburner Fuel Control Inlet Screen for Contamination (230) and Damage (Clean Screen Installed).	015
23HB-	Afterburner Fuel Control Bypass Screen for Contamination (230) and Damage (Clean Screen Installed).	015
23GAA	Afterburner Exhaust Nozzle Actuator Control Unit, Lines, and Connections for Security (730) and Evidence of Leakage (381).	005
23GQS	Afterburner Exhaust Nozzles Air Pressure Tested in Accordance with TO IF-106A-2-4.	060

WUC	DESCRIPTION	MAN TIME (min)
23DAA	Outer Surface of Diffuser Case for Cracks (190) with Special Attention to Area Adjacent to Welds.	010
23EBA	Turbine Exhaust Case, Externally, for Cracks (190), Warpage (780), and Evidence of Hot Spots (900).	010
23EBO	Turbine Exhaust Section Inspected in Accordance with TO 2J-J75-6.	025
23EA-	Visible Second and Third Stage Turbine Rotor Assemblies for Missing (750), Distorted (780), or Broken (070) Blades and Evidence of Overheat Damage (900) (with Special Attention to Third Stage Turbine Shroud). Third Stage Nozzle Guide Vane Trailing Edges for Nicks (425), Cracks (190), and Evidence of Overheating (900).	010
23EAN	Third Stage Turbine Wheel for Contact with Adjacent Surfaces by Rotating Wheel at Least One Revolution By Hand.	005
23GQA	Exhaust Cone for Cracks (190), Warpage (780), Dents (020), Evidence of Hot Spots (900), and Buckling (109).	005
23GQC	Exhaust Cone Tie Rods for Cracks (190), Warpage (780), Dents (780), Evidence of Hot Spots (900), and Buckling (780).	005
23JQH	No. 6 Bearing Oil Supply Line Screen (External) for Contamination (230) and Damage (Clean Screen Installed).	030
23JQF	Engine Fuel-Oil Cooler Connections for Leakage (381) and Security (730). Mounting Brackets for Cracks (190) and Security (730).	010
23JAA	Oil Tank Drains for Water and Foreign Matter (230).	010
23---	Engine and Accessories for Fluid Leakage (381), Loose (105) or Missing (106) Nuts, Bolts, Studs, and Clamps.	005
23---	Engine Vents and Breather Openings for Obstructions.	005
23BAA	Compressor Inlet Case Seal Assembly for Damage, Spring Loads for Binding (135).	010
23HAF	Engine Fuel Pump Assembly for Security (730) and Evidence of Leakage (381).	005
23HAF	Engine Fuel Pump Electrical Connections for Tightness (730).	005
23KQA	Combustion Starter Adapter Case Seals for Excessive Leakage (381).	010
23KQ-	Starter Components for Damage and Security (730).	005
23KQ-	Starter Ducts, Turbine, and Electrical Connections, Switches and Controls for Damage and Security (730).	010
23KQA	Oil Drained from Combustion Starter Reservoir. Magnetic Sump Plug for Metal Particles (372). Reservoir Reserviced. Filler Plug Secured.	060

WUC	DESCRIPTION	MAN TIME (min)
23HAD	Engine Main Fuel Control for Security (730). Electrical Connections for Cleanliness (230) Damage and Security (730).	020
23---	Oil, Fuel and Hydraulic Hose for Deterioration (117), Stretching (780), Proper Routing, Twisting (780) or Binding (135) in Excess of Tolerances.	060
23JAA	Engine Oil System Drained and Reserviced.	090
23JAA	Engine Oil Tank for Cracks (190), Scratches (935), Dents (780), Leakage (381), and Security (730).	005
23---	Engine Oil Lines, (Feed, Return, Drains, Overflow, and Vent), Components and Connections for Cracks (190), Scratches (935), Dents (780), Leakage (381), Chaffing (020), Proper Routing and Security (730).	015
23JAA	Engine Oil Tank Scupper and Scupper Drain for Foreign Material (230).	005
23JAF	Engine Fuel-Oil Cooler for Dents (780), Leakage (381), and Security (730).	010
23JAF	Engine Fuel-Oil Cooler Viscosity Valve for Dents (780), Leakage (381) and Security (730).	005
23GQR	Exhaust Nozzle Actuating Cylinder Heat Shields for Damage and Security (730).	015
23HQ-	Afterburner Fuel Manifold for Cracks (190), Secu- rity (730), and Evidence of Leakage (381).	015
23H--	Afterburner Fuel Lines for Cracks (190), Security (730) and Evidence of Leakage (381).	020
23HQE	Afterburner Manifold Drain Valve for Cleanliness (230) and Freedom of Operation (135).	025
23H--	Afterburner Fuel Drain Lines for Obstructions.	005
23GQ-	Afterburner and Diffuser Duct (Including Inner Liner) for Ruptures (780), Cracks (190), Flat Spots (780), and Heat Damage (900). Afterburner Inner Diameter Check Performed.	060
23EAT	No. 6 Bearing for Evidence of Oil Leakage (381). Afterburner for Accumulation of Soot (230).	010
23---	Rod End Bearings, Bellcrank Bearings and End Fittings for Roughness, Evidence of Wear (020), Corrosion, Misalignment (123), Lack of Lubrica- tion (410) and Security (730).	030
23HQD	Spray nozzles for Excessive Carbon Deposits (230).	005
23HQ-	Spray Bars for Specified Mounting and Excessive Wear (020) in Afterburner Cone Weldments. Spray Nozzle Pigtail Tube for Damage and Security (730).	005
23GQ-	Spray Bar Bosses for Heat Damage and Cracks (190) (Fluorescent Penetrant Method).	030

WUC	DESCRIPTION	MAN TIME (min)
23GQ-	Flame Holder Assembly V Section, Sides, Front, and Tie Rods for Burned Spots (900), Cracks (190) Lip Over, Excessive Warpage (780), and Undue Heat Discoloration. Assembly for Security (730) (Flame Holder Removed).	005
23GQ-	Exhaust Nozzles for Specified Opening and Closing by Applying Air Pressure to Manifold.	005
23GQ-	Afterburner Exhaust Nozzle Mechanical Linkage for Cracks (190), Freedom of Movement (135) and Security (730).	005
23GQ-	Afterburner Exhaust Nozzle Segments for Scoring (935), Galling (020) and Evidence of Binding (135) and Clearance from Exhaust Gas Path when Nozzle is Opened.	005
23GQM	Exhaust Nozzle Segment Rollers for Free Movement (135).	010
23GQ-	Exhaust Nozzle Segment Roller Brackets for Distortion (780) or Damage.	010
23GQQ	Afterburner Exhaust Nozzle Segment Actuators for Damage, Wear (020), Evidence of Malfunction and Cleanliness (230) (Actuators Disassembled).	150
23GQL	Afterburner Nozzle Support for Cracks (190) and Damage.	010
23GQ-	Afterburner Nozzle Air Seal, P/N 233962, for Excessive Wear (020), Finger Breakage (070) and Cracks (190).	010
23KAF	Igniter Plug for Cleanliness (230). Insulators for Cracks (190), Electrodes for Burning Beyond Specified Limits (900).	015
23KAE	Igniter Plug Lead Terminal Assemblies for Cleanliness (230), Spring Connector for Positive Electrical Contact.	015
23KA-	Flexible Conduits Connecting Components of Ignition System for Chafing (020) and Evidence of Burning (900), Braided Metal Covering for Fraying (020). Connections for Security (730).	015
23KAA	Ignition Exciter Boxes for Damage and Evidence of Overheating (900).	005
23KAC	Ignition Compositors for Damage and Evidence of Overheating (900).	005
23KAB	Ignition Leads for Damage and Evidence of Overheating (900).	005
23PQ-	Thrust fittings, Turnbuckles, Bolts, and Pins for Cracks (190), Corrosion, Misalignment (127), Security (730), and Evidence of Wear (020). Thrust Mount Bearing for Galling (020) or Binding (135).	010

WUC	DESCRIPTION	MAN TIME (min)
23MA-	Exhaust Temperature Thermocouples and Harness for Damage, Security (730), Internal and Insulation Resistance.	005
23JQN	Main Fuel Control Temperature Bulb for Damage and Security (730).	005
23HQ-	Main Fuel Control Pressure Probe for Damage and Security (730), Sense Cables for Cleanliness (230), Damage and Security (730).	010
23JAG	Engine Oil Breather Pressurization Valve for Evidence of Leakage (381).	005
23JAG	Engine Oil Breather Pressurizing Valve Mounting Bracket for Cracks (190) and Security (730).	005
23MSC	Engine Oil Low Pressure Warning Switch for Corrosion, Damage, Leakage (381), and Security (730).	005
23MS-	Engine Oil Pressure Components, Warning Switch Lines and Connections for Corrosion, Damage, Leakage (381), and Security (730).	005
23MTA	Fuel Flow Transmitter for Leakage (381) and Security (730). Electrical Connection for Security (730).	005
23HAF	Engine Driven Fuel Pump Drive Spine for Wear and Lubrication. Oil Mist Lubrication Orifice (.052) in Gear Shaft for Obstructions.	015
23---	First, Second and Third Stage Turbine Blades for Cracks, Stretch, Nicks, Loose Blades, Heat Damage, Loose Rivets, Shingling and Loss of Preload. Nozzle Guide for Cracks, Bowing, Distortion, Nicks and Heat Damage.	030
23---	First Stage Turbine Outer Seal, Second and Third Stage Turbine Inner and Outer Seals for Crack and Wear.	015
23---	Turbine Rotor Assembly for Uninterrupted Rotation After Inspection or Repair.	003
23---	Oil Pressure Scavenge and Breather Lines in Number 6 Bearing Area for Cracks and Security.	010
23CC-	Oil Pressure Relief P/N 463685 for the Following: A. Specified Spring Pressure. B. Liner Bore for Smoothness and Freedom from Foreign Material. C. Piston OD and ID for Smoothness. Piston Seating Surface for Proper Seating. D. Spring Seat for Wear and Corrosion.	030
23KA-	Ignition System Audibly for Proper Operation.	010
23---	Engine Pressure Check Performed with External Pneumatic Power Source Connected and Starter Engaged for Approximately 20 Seconds.	160

WUC	DESCRIPTION	MAN TIME (min)
	<p>A. Check the Following for Leakage (381):</p> <p>(1) Engine Fuel System Components, Lines and Connections (Forward of Fire Seal).</p> <p>(2) Engine Lubricating Oil System Components, Lines and Connections.</p> <p>B. Engine Main Fuel System Drains for Proper Venting when Throttle is Placed in Off Position.</p> <p>C. Afterburner Fuel System Drains for Proper Venting when Throttle is Placed in Off Position.</p> <p>D. Engine for Sounds which May Indicate Foreign Particles (230) in Compressor Section, Turbine Blades Dragging or Faulty Shaft Bearings (Starter Disengaged and Engine Coasting).</p>	
23SR-	Remote Mounted Constant Speed Drive Drain Plug for Metal Particles (372) (Resistance Check).	003
23SRA	Constant Speed Drive Oil Lines (Feed, Return, Drains, Overflows, and Vents), Components and Connections for Cracks (190), Scratches (935), Dents (780), Leakage (381), Chaffing (020), and Security (730).	003
23SRA	Constant Speed Drive Oil Tank for Cracks (190), Scratches (935), Dents (780), Leakage (381) and Security (730).	002
23SRA	Constant Speed Drive Oil Tank Drain for Water and Foreign Matter (230).	002
23SRA	Constant Speed Drive Oil System Drained and Reser- viced.	040
45---	Accessible Hydraulic Components, Lines, Hose, and Connections for Leaks (381), (During Engine Run).	020
49A-- AL1	Fire and Overheat Detector Loops for Specified Re- sistance from Cable Center Conductor to Ground. Cable and Intercable Connectors for Clean Contact. Cable Connector for Specified Sealing. Cables for Kinks and Sharp Bends (780). Clamps, Grommets and Anti-chafing Provisions (Nylon Bushing or Sealant) for Damage and Security (730).	
49A--	Fire and Overheat Detection Loop System for Speci- fied Resistance Prior to Engine Installation and Immediately After Engine has been Rolled Forward into Position.	
49AM1	Wiring for Kinks, Sharp Bends and Damage	010
11D-- DEF	Engine Inlet Ducts (Particularly Between Station Areas 316 and 472 for Aerodynamic Smoothness, Dents (780), Cracks (190), and Freedom from Foreign Material (230).	030
11--- DGO DGA DGC DHO	Bulkheads, Beltframes, Stiffeners, Angles, and Gus- sets (Particularly in Tail Cone and Fuselage Aft of Engine Accessory Compartment for Cracks (190) in Area of Flange Radit and Attach Point of Fuselage and Empennage.	030

WUC	DESCRIPTION	MAN TIME (min)
11DEA, DEB	Beltframe and Longerons Station 431, for Cracks (190) and Corrosion.	015
23SR-	Constant Speed Drive Oil System Components, Lines, Hose and Connections for Leakage (381). (During Engine Run.)	020
23SRL	Constant Speed Drive Oil System Return Line Oil Filter for Clogged Indication, Clean Filter Installed and for Damage and Security.	010
23SR-SRD	Constant Speed Drive Air Oil Cooler for Cracks (190) Mounting Brackets for Security (730) and Evidence of Structural Failure, Air Ducting for Damage (190) and Security (730) with Constant Speed Drive Air Oil Cooler Removed.	180
23SQD	Constant Speed Drive Magnetic Trim Governor for Cleanliness (230).	005
23SQA	Remote Mounted Constant Speed Drive Unit for Oil Leaks (381), Cracks (190) or Damage.	003
23JQ-JQA	Engine Air Oil Cooler Components for Specified Operation. (Ref TO IF-106A-2-4).	030
23---	Trim Engine in Accordance with TO IF-106A-2-4.	300
23NQ-	Throttle System Bellcranks and Linkage for Corrosion.	005
45---	Accessible Engine Area Hydraulic and Pneumatic Lines and Connections for Corrosion.	005
46---	Accessible Engine Supply Fuel System Lines, Components and Connections for Corrosion.	015
23A--	Engine Inlets for Corrosion.	005
23J--	Engine Oil System Components for Corrosion.	005
235--	Engine Constant Speed Drive Components for Corrosion.	015
49A--	Fire and Overheat Detection Connections for Corrosion.	010
11DCF	Engine Keel Beam for Corrosion Damage and Security (730).	002
23JB-	Engine Oil Pumps and Components for Damage and Security (730).	005
23NQ-	Throttle Quad Components and Linkage for Damage and Security.	010

LUBRICATION/SERVICE ACTIVITIES

These requirements are performed every 200 flight hours unless indicated otherwise.

WUCs	DESCRIPTION	MAN TIME (min)
115 - -	Canopy Components Lubrication	060
13 C--, ACD, DB-1, ACB, ACC, BB1, AD1	Nose Gear Lubrication (Every 100 Flight-Hours)	040
13AAE, EE1, AB1, AA-, AAF, AAD, AG1, BA1	Main Gear Lubrication (Every 100 Flight Hours)	055
13BD1, AJ1	Nose Gear Door Lubrication (Every 100 Flight Hours)	010
13BC1, AE1, AF1	Main Gear Door Lubrication (Every 100 Flight Hours)	040
14DD1, CE1, CF1, DE1, D--	Elevon Lubrication	120
14JF1, JB1	Speed Brake Door Lubrication (Every 100 Flight Hours)	025
14EM1, FA1	Rudder Components Lubrication	060
14J --	Speed Brake Door Hinge Pins Removed and Checked for Wear (020) and Lubrication (Pins Removed). (Lubricate with Solid Film Lubricant, FSN 9150-754-0064, MIL-L-23398A (ASG))	040
14JF1, JB1	Speed Brake Door Lubrication	040
23 KQ -	Starter Reservoir Reserviced	002
23J--	Engine Oil System Drained and Reserviced with Oil Specification MIL-L-7808.	030
23QQ	Variable Ramp Lubrication (Every 400 Flight Hours)	120
41A	Refrigeration Unit Oil System Drained and Reserviced	020
42F --	Drain and Reservice Air Turbine Drive Oil System	020
42F --	Air Turbine Drive Oil Filter Replaced (Every 400 FH)	020
45C --	Ram Air Turbine Assembly Lubrication	020
45AC1	Primary Reservoir Filter Element Replaced. Accessible Internal Area of Reservoir and Reservoir Cover for Corrosion and Pitting	010
45BC1	Secondary Reservoir Filter Element Replaced. Accessible Internal Area of Reservoir and Reservoir Cover for Corrosion and Pitting	010
45GAA	Primary/Secondary Reservoir Pressurization Filter Element for Contamination (230) (Clean Element Installed).	015

WUCs	DESCRIPTION	MAN TIME (min)
45AJA	Primary Case Drain Line Filter Element for Contamination (230) (Clean Element Installed).	015
45BJA	Secondary Case Drain Line Filter Element for Contamination (230) (Clean Element Installed).	015
45AGA	Primary High Pressure Filter Element for Contamination (230) (Clean Filter Installed).	015
45BGA	Secondary High Pressure Filter Element for Contamination (230) (Clean Filter Installed).	015
45JFA, JRA	Rapid Tune Magnetron Filter Elements for Contamination (230) (Clean Elements Installed). System Bled and Purged I/A/W to 1F-106A-2-3.	180
75 DC1	Launcher Uplatch Lubrication (2 Places F-106A and 4 Places F-106B)	005
75A --	Missile Bay Door Lubrication	005
46H --	External Tank Pylon Lubrication	105
46J --	Slipway Door Actuator Linkage for Proper Lubrication	003

IRAN

This inspection package will be performed at 48-month intervals.

WUC	DESCRIPTION	MAN TIME (min)
11E-- F--	Wing Structure (Spars 3&4) Adjacent to Main Gear Attaching Points within Three Inch Radius of Gear Attach Bushing for Cracks (190) (Fluorescent Penetrant Method).	015
11---	Accessible Lower Eight Inches of Airframe Nose Gear Support Fitting and Remaining Upper Portion of Support Fitting for Cracks (190) Fluorescent Penetration Method).	010
11GAG	Stabilizer Tip Dehydrated and Sealed as Determined by X-Ray.	120
11---	Aircraft Depainted and Repainted with Polurethane Type Paint in Accordance with TO 1-1-2, 1-1-4 and 1-1-8.	030
11GA-	Vertical Stabilizer Honeycomb Skin Panels for Delamination.	010
110--, DDH, DEB, DGF,	Fuselage Interior Structure for Excessive Wear (020), Loose or Missing Bolts, Nuts, Hardware (105), Cracks (190) and Damage and Security (730).	020
11DHC	Tail Cone Seal for Deterioration (117) or Tears (947) and Hardware for Wear (020) Damage and Security (730).	005
11HA-, HA1	Windshield Assembly for Delamination (846) Cracks (190), Loose or Missing Bolts and Hardware (105) and Damage and Security (730).	010
11J--, JB1, JN1,	Canopy System for Excessive Wear (020), Loose or Missing Hardware (105) Cracks (190) and Damage and Security (730).	010
11E--, F--, EAB, FAB, EBB, FBB, ELL, FLL, ECK, FCK, EDL, FDL	Wing for Aerodynamic Smoothness, Uniformity, of Contour (780) and Loose (730), or Missing Bolts Screws, and Rivets (106), Cracks (190) and Wear (020).	040
11D--	Fuselage for Aerodynamic Smoothness, Cracks (190), Abrasions (935), Buckles (780), Uniformity of Contour (780) and Loose or Missing (106) Bolts, Screws and Rivets (105).	020
11---	Stiffeners, Angles, Brackets and Fasteners in the RAM Air Turbine Well and Forward and Aft Electronics Compartments for Corrosion, Cracks (190) and Security (730).	015
11G--, GAE	Vertical Stabilizer, Leading Edge, Fairings for Aerodynamic Smoothness, Dents (780), Cracks (190), and Freedom from Foreign Materials (230).	015

WUC	DESCRIPTION	MAN TIME (min)
11---, FCJ, FDG, EAH, FAH, ECJ, EDG	Internal Structure of Wing and Fuselage Fuel Tanks for Cleanliness (230), Corrosion (170), Cracks (190), and Evidence of Structural Failure. Visible Structural Adhesive Prime or Corrosion Preventative Coating for Deterioration (117) and Damage. Sealant for Deterioration and Damage. Nut Plates for Security (730) and Stripped Threads. (Access Panels NR 5, 6, 27, 28, 31, 32, 39 and 40 Removed.)	2400
11HB1	Blastshield for Corrosion, Damage and Security (730) [F-106B only].	015
12---	Egress Hoses for Obstructions (Hose and Connection Removed).	005
12---	Accomplish Continuity Check of all Egress System Ballistic Hoses and Fittings to Assure Unrestricted Flow of Ballistic Gas Pressure Throughout the System.	300
12---, AD1, AE1, AF1, AG1, BP1, DA1, AB1	Cockpit and Fuselage Compartment for Cleanliness (230), Loose or Missing Hardware (105), Broken Hardware (108), Glare Shields for Wear (020), Cracks (190), Deterioration (117) and Components for Damage and Security.	
13A-- , AAH	Accomplish the following on Main Landing Gear Components as applicable.	
	Replace Cure Dated Components in Main Gear Strut and Actuating Cylinder Assemblies.	420
	Main Gear Strut and Side Brace Assemblies for the Following (Shock Strut, Side Brace and Actuating Cylinder Removed).	3600
	(1). All Components Visually for Corrosion, Cleanliness, Damage, Cracks, Security and Paint for Deterioration.	
	(2). Pivot Beam Pins for Excessive Wear, Galling and Corrosion.	
	(3). Fore and Aft Drag Struts at Upper and Lower Attaching Points and Attaching Bolts, Pivot Beam Pins, Side Brace Boss, Side Brace Boss Pin, Actuating Cylinder Attach Point and Torque Arms for Cracks (Using Fluorescent Penetrant or Magnetic Particle Method).	
	(4). Outer Surface of Piston and Axle, (Piston Removed for Cracks (Using Fluorescent Penetrant or Magnetic Particle Method).	
	(5). Outer Surface of Cylinder for Cracks, Damage and Corrosion (Using Fluorescent Penetrants Method).	
	(6). Entire Inner Surface of Outer Cylinder (Visually for Cracks and Corrosion.	

WUC	DESCRIPTION	MAN TIME (min)
13AG1	Main Landing Gear Fairing, Linkages and Fittings for Wear (020), Security (730), Cracks (190) and Distortion (780). Links P/N 8-17675-1/8-17676, Removed and Fluorescent Penetrant Inspection I/A/W to IF-106A-36.	180
13A-- AAH	Accomplish the following on Nose Gear Components as Applicable. Replace Cure Dated Components in Nose Gear Strut and Actuating Cylinder Assemblies. Nose Gear Shock Strut and Drag Brace for the Following (Shock Strut and Drag Brace Assemblies Removed). (1). All Components Visually for Corrosion, Cleanliness, Damage, Cracks, Security and Paint for Deterioration. (2). Gear Support Pins for Galling, Corrosion and Wear. (3). Shock Strut Pivot Pin Area, Gear Support Pins, Actuating Cylinder Attach Arms, Upper and Lower Drag Strut Attaching Lugs, Steer Damper Attach Lugs, Steering Arm Collar and Torque Arms for Cracks (Using Fluorescent Penetrant Or Magnetic Particle Method). (4). Outer Surface of Strut Piston for Cracks (Piston Removed) (Using Magnetic Particle Method) (Place Emphasis on the Upper Chrome Lip and Three Inches Below the Lower Sissor Attaching Lug Area). (5). Outer Surface of Strut Piston for Corrosion (Piston Removed). (6). Entire Outer and Inner Surface of Outer Cylinder for Cracks, Damage and Corrosion (Using Fluorescent Penetrant Method).	210 1200
13AB1	Main Gear Side Brace Torque Shaft Trunion and Bridge Support Fittings (Fwd and Aft) for Cracks (190) (Fluorescent Penetrant Method) (Fittings Installed).	005
13J--	Tail Arrestor Hook System Components for Wear, Binding, Improper Alignment, Damage and Security.	005
13B--, BD1, BE1, BF1, EE1, E--, EEA	Landing Gear System Hydraulic Components and Electrical Components for Cleanliness, Loose or Missing Hardware, Evidence of Leakage, Damage and Security.	
13C--, CC1	Nose Wheel Steering Components for Evidence of Leakage, Damage and Security.	010
13G--, H--, GE1	Emergency Landing Gear System Components for Evidence of Wear, Leakage, Binding, Damage and Security.	010
14---	Elevons and Rudder Dehydrated and Sealed (as Determined Necessary by X-Ray).	360

WUC	DESCRIPTION	MAN TIME (min)														
14CH1, CJ1	Control Stick Base Assembly for Corrosion and Cracks (190) (Unit Removed) (Fluorescent Penetrant or X-Ray Method). Boot for Cracks, Tears and Damage.	240														
14---	Flight Control Rod End Fittings for Cracks (Fittings Installed in Tube) (Magnetic Particle, (Fluorescent Penetrant or Ultrasonic Method).	240														
14---	Rod Ends and Bellcranks for Roughness, Evidence of Wear, Corrosion, Misalignment, Damaged Seals, Contamination and Security (Components Disconnected), Bearings Lubricated.	480														
14---	Rudder Cable End Fittings and Control Pulley Bearings for Cracks, Corrosion, Misalignment, Evidence of Wear, Roughness and Contamination. Cable End Fitting Holes for Elongation and Attaching Bolts for Wear (Cables Disconnected).	120														
14BA1 B--	Aileron Components and Torque Tube for Corrosion, Wear, Damage, Bearings for Roughness, Binding, Cleanliness and Adequate Lubrication (Torque Tube Disconnected).	120														
14C--, CCA, CLB	Eleven Components and Mixer Assembly for Wear, Damage, Binding, Cleanliness and Security. NDI Inspection of Mixer Assy IAW1F-106A-36.	020														
23N--, NQA, NQD, NQE, NQJ	Remove Throttle Quadrant and Replace with a New or Overhauled Same or Like Quadrant.	1380														
23QQ-	Variable Ramp Screw Jack Gimbal Pins Lubricated (8 Places) (Ref to IF-106A-2-2).	030														
23QQ-	Variable Ramp Screw Jack Boots for Deterioration.	010														
23QT-, QTA	Variable Ramp Controls for Damage and Security.	005														
23S00, SQB, SQM, SQD, SR-, SRE	Constant Speed Drive System Components for Damage and Security.	030														
23HA0, HAH, JAF, JAJ	Engine Fuel and Oil System Components for Damage and Security.	015														
23KQ-, KQC, KQL, KQP	Engine Ignition and Start System Components for Damage and Security.	015														
23M--, MS-, MSA,	Engine Instrumentation System Components for Damage and Security.	010														
41---	Following Listed Hot Bleed Air Ducts for Leaks and Damage in Accordance with F106A/B MOD/IRAN Work Specification and TO IF-106A-2-3.	3600														
	<table><tr><td>F106A</td><td>F106B</td></tr><tr><td>8-23224-803</td><td>8-23224-803</td></tr><tr><td>8-23208-805</td><td>8-25011-3</td></tr><tr><td>8-23246-5</td><td>8-25011-5</td></tr><tr><td>66J40229-6</td><td>68E37334-1</td></tr><tr><td>66J40230-16</td><td>68E37334-3</td></tr><tr><td>66J40231-7</td><td>8-25111-3</td></tr></table>	F106A	F106B	8-23224-803	8-23224-803	8-23208-805	8-25011-3	8-23246-5	8-25011-5	66J40229-6	68E37334-1	66J40230-16	68E37334-3	66J40231-7	8-25111-3	
F106A	F106B															
8-23224-803	8-23224-803															
8-23208-805	8-25011-3															
8-23246-5	8-25011-5															
66J40229-6	68E37334-1															
66J40230-16	68E37334-3															
66J40231-7	8-25111-3															

WUC	DESCRIPTION	MAN TIME (min)
	<div>F106A</div> <div>F106B</div> <div>8-23245-1</div> <div>8-25115</div> <div>8-23576-803</div> <div>8-25122-3</div> <div>8-23997-1</div> <div>8-25383</div> <div>65E35696-1</div> <div>8-25788-3</div> <div>8-23403-3</div> <div>8-25793-1</div> <div>8-23213-1</div> <div>63E35691-1</div> <div>63E35693-1</div> <div>8-25051-1</div> <div>8-23403-3</div> <div>8-23213-1</div>	
41A--, AA1, AB1, AC1, D--,	Air Conditioning and Pressurization System Components for Damage and Security.	030
42---, FG1	Electrical Wiring and Associated Hardware From Power Source to Operating Units for Damage and Security. Components and Access Plates Should be Removed as Appropriate to Assure Effective Inspection.	900
42---	Remove and Route Instrument Panel for Replacement of all Wiring with Miniature Wire (MIL-81044/9) and Potted Plugs with Environmentally Sealed Connectors (As Available), (If not Previously Accomplished).	900
42---	Cockpit, Left Hand Electronics Compartment (Radar Side), Landing Gear and Control Stick Base for Defective Wiring Harness. (Defective Wiring Harnesses will be Replaced with Miniature Wire (MIL-81044/9) and Potted Plugs with Environmentally Sealed Connectors. (As Available). (If not Previously Accomplished).	600
42---	464074 Rack Connectors P07401, P07402, P07403, P07404 and P07405 for Installation of Environmentally Sealed Type Connectors.	030
42---	Potted Electrical/Electronic Plugs, Relays, Solenoids or Other Components for Deterioration or Porous Compound. Compound for Adhesion.	360
42---	Perform Circuit Analyzer Check of all Rack Wiring and Correct Discrepancies. (Note: This Requirement is Limited to Racks Having Electrical Wiring and Connectors.	120
42---	Perform Circuit Analyzer Check of All Cockpit Instrument Panel Wiring and Correct Discrepancies.	090
42---, AF1, AL1, AM1, CD1	Perform Circuit Analyzer Check in Accordance with Established Current Depot Analyzer Test Program.	2400
42E--, EG1, F--, FB1, FJ1	Emergency AC Power System and Air Turbine Components for Damage and Security.	040
44---, FM1	Inspect Lighting System Components for Damage and Security and Operation.	010
45CF1	RAM Air Turbine Control Valve, P/N 12400-1 for Specified Operation. (Remove for Bench Check).	030

WUC	DESCRIPTION	MAN TIME (min)
45G00, GB1	Reservoir Pressurization System Components for Damage and Security.	010
45E--, H--, HA1	Pneumatic System Components for Damage and Security.	020
45A--, 45B--	Hydraulic System Components for Damage and Security.	030
46CB1	"T" and "F" Tank Fuel Vent Valves, P/N 8-105455 and 8-106455, for Assembly Date. (Valves Found to be Four Years or Older (or if Date Cannot be Determined) will be Removed and Routed for Kit Installation in Accordance with TO 6J15-8-94-3, Dated 14 April 1969.	030
46---, CA1, CK1, Q--	Fuel System Components for Damage and Security.	020
46G--, GA1, GE1, GF1, GG1, GH1, GJ1	Fuel Quantity System Components for Damage and Security.	010
47A--	Oxygen System Components for Damage and Security.	010
52--	AFSC Components for Damage and Security.	010
74DD1	Radome for Damage, Aerodynamic Smoothness and Test in Accordance with TO 1-1-24A, Fig 8-11, Page 8-11 and 8-12, Dated 22 Nov 1963.	480
75--	Perform Loop Resistance Checks to the MB-1 Arm/ Safe Circuit Using the Loop Resistance Tester. Part Number 68D13020 (in Accordance with Instructions Contained within the Tester).	060
93--	<p>Drag Chute Installation for the Following:</p> <ol style="list-style-type: none"> (1). Anchor Jaw Mechanism Linkage, Cables, Stops and Electrical Switches for Wear and Specified Adjustment (Unit Removed). (2). Cylinder Pin for Wear, Pin Retaining Rings for Security. (3). Fittings and Brackets for Cracks, Corrosion and Security. (4). Bolts, Pins and Bushing for Wear and Security. (5). Rip Cord and Pulley Assembly for Bends, Cracks or Damage. (6). Release Level for Freedom of Movement. (7). Jaw Mechanism for Lubrication. (8). Drag Chute Deployment and Jettison Cylinders Removed. Soft Goods and "O" Rings Replaced. 	360

APPENDIX VI

WORK UNIT CODES FOR DATA BANK

APPENDIX VI
WORK UNIT CODES FOR DATA BANK

System 11000 — Airframe

11000	11DCC	11DFJ	11EBG	11FAH	11FDF	11JN1
11C00	11DCD	11DG0	11EBH	11FAJ	11FDG	11JP1
11CA1	11DCE	11DGA	11EBJ	11FAK	11G00	11JQ1
11CAA	11DCF	11DGB	11EBK	11FAL	11GA0	11JR1
11CB1	11DCG	11DGC	11EC0	11FB0	11GAA	11JS1
11CBA	11DCH	11DGD	11ECA	11FBA	11GAB	11JT1
11CC1	11DCJ	11DGE	11ECB	11FBB	11GAC	11K00
11CCA	11DCK	11DGF	11ECC	11FBC	11GAD	11KA1
11CD1	11DD0	11DGG	11ECD	11FBD	11GAE	11KB1
11CDA	11DDA	11DH0	11ECE	11FBE	11GAF	11KC1
11CE1	11ddb	11DHA	11ECF	11FBF	11GAG	11KD1
11CEA	11DDC	11DHB	11ECG	11FBG	11H00	11KE1
11CF1	11DDD	11DHC	11ECH	11FBH	11HA1	11KF1
11CFA	11DDE	11DHD	11ECJ	11FBJ	11HAA	11KG1
11CG1	11DDF	11DHE	11ECK	11FBK	11HAB	11KH1
11CGA	11DDG	11E00	11ECL	11FC0	11HBI	11KJ1
11CH1	11DDH	11EA0	11ECM	11FCA	11J00	11KK1
11CJ1	11DE0	11EAA	11ECN	11FCB	11JA1	11KL1
11D00	11DEA	11EAB	11ED0	11FCC	11JAA	11L00
11DA0	11DEB	11EAC	11EDA	11FCD	11JAB	11LA1
11DAA	11DEC	11EAD	11EDB	11FCE	11JAC	11LB1
11DAB	11DED	11EAE	11EDC	11FCF	11JAD	11LC1
11DAC	11DEE	11EAF	11EDD	11FCG	11JAE	11LD1
11DAD	11DEF	11EAG	11EDE	11FCH	11JAF	11LE1
11DAE	11DEG	11EAH	11EDF	11FCJ	11JB1	11LF1
11DAF	11DEH	11EAJ	11EDG	11FCK	11JC1	11LG1
11DB0	11DF0	11EAK	11F00	11FCL	11JD1	
11DBA	11DFA	11EAL	11FA0	11FCM	11JE1	
11DBB	11DFB	11EB0	11FAA	11FCN	11JF1	
11DBC	11DFC	11EBA	11FAB	11FD0	11JG1	
11DBD	11DFD	11EBB	11FAC	11FDA	11JH1	
11DBE	11DFE	11EBC	11FAD	11FDB	11JJ1	
11DC0	11DFF	11EBD	11FAE	11FDC	11JK1	
11DCA	11DFG	11EBE	11FAF	11FDD	11JL1	
11DCB	11DFH	11EBF	11FAG	11FDE	11JM1	

System 12000 — Cockpit and Fuselage Compartment

12000	12AD1	12BA1	12BF1	12BL1	12BR1	12BX1	12BZ4
12A00	12AE1	12BB1	12BG1	12BN1	12BU1	12BY1	12DA1
12AA1	12AF1	12EC1	12BH1	12BP1	12BV1	12BZ1	12DC1
12AB1	12AG1	12BD1	12BJ1	12BQ1	12BW1	12BZ2	12DD1
12AC1	12B00	12BE1	12BK1	12BS1	12BT1		

System 13000 — Landing Gear

13000	13ACA	13BB1	13CG1	13DEA	13EC1	13FF1	13HG1
13A00	13ACB	13BCA	13CH1	13DEB	13EE1	13FG1	13J00
13AA1	13ACC	13BC1	13CJ1	13DEC	13EEA	13FH1	13JA1
13AAA	13ACD	13BD1	13CK1	13DED	13EF1	13GC1	13JB1
13AAB	13ACE	13BE1	13CL1	13DEE	13EG1	13GE1	13JC1
13AAC	13ACF	13BF1	13CM1	13DEF	13EH1	13GH1	13JD1
13AAD	13ACG	13BG1	13CN1	13DF1	13EJ1	13GT1	13JE1
13AAE	13AD1	13BH1	13CP1	13DG1	13EK1	13H00	13JF1
13AAF	13AE1	13C00	13CQ1	13DH1	13EL1	13HA1	13JG1
13AAG	13AF1	13CA1	13DA1	13DJ1	13EM1	13HB1	13JH1
13AAH	13AG1	13CB1	13DB1	13DK1	13EN1	13HC1	13JJ1
13AAJ	13AH1	13CC1	13DC1	13DL1	13EP1	13HD1	13JK1
13AAK	13AJ1	13CD1	13DD1	13E00	13F00	13HE1	13JL1
13AB1	13B00	13CE1	13DE1	13EB1	13FE1	13HF1	13JM1
13AC1	13BA1	13CF1					

System 14000 — Flight Controls

14000	14BC1	14CF1	14DE1	14EK1	14GB1	14HB1	14JE1
14A00	14BD1	14CG1	14DF1	14EL1	14GC1	14HC1	14JF1
14AA1	14BE1	14CH1	14E00	14EM1	14GD1	14HD1	14JG1
14AB1	14BF1	14CJ1	14EA1	14EN1	14GE1	14HE1	14JH1
14AC1	14C00	14CK1	14EB1	14EP1	14GF1	14HF1	14JJ1
14AD1	14CA1	14CL1	14EC1	14F00	14GG1	14HG1	14JK1
14AE1	14CB1	14CM1	14ED1	14FA1	14GH1	14HH1	14JM1
14AF1	14CC1	14D00	14EE1	14FB1	14GL1	14J00	14JN1
14AG1	14CCA	14DA1	14EF1	14FBA	14GM1	14JA1	14JP1
14B00	14CCB	14DB1	14EG1	14FC1	14GN1	14JB1	14JQ1
14BA1	14CD1	14DC1	14EH1	14G00	14H00	14JC1	14JR1
14BB1	14CE1	14DD1	14EJ1	14GA1	14HA1	14JD1	

Subsystems 23H00 Through 23S00 - Engine Accessories

23H00	23JAA	23K00	23LBA	23NQJ	23PRB	23QRD	23SQG
23HA0	23JAB	23KA0	23LQC	23NQK	23Q00	23QRE	23SQH
23HAA	23JAC	23KAA	23LQD	23NQL	23QQ0	23QRF	23SQJ
23HAB	23JAD	23KAB	23MA0	23NQM	23QQA	23QRG	23SQK
23HAC	23JAE	23KAC	23MAA	23NQN	23QQB	23QRH	23SQL
23HAD	23JAF	23KAD	23MAB	23P00	23QQC	23QRJ	23SQM
23HAE	23JAG	23KAE	23MAC	23PQA	23QQD	23QS0	23SQN
23HAF	23JAH	23KAF	23MB0	23PQB	23QQE	23QSA	23SQP
23HAG	23JAJ	23KAG	23MBA	23PQC	23QQF	23QSB	23SQQ
23HAH	23JAK	23KAH	23MQ0	23PQD	23QQG	23QSC	23SQR
23HAJ	23JB0	23KQ0	23MQA	23PQE	23QQH	23QSD	23SQS
23HAK	23JBA	23KQA	23MR0	23PQF	23QQJ	23QSE	23SQT
23HAL	23JBB	23KQB	23MRA	23PQG	23QQK	23QSF	23SQU
23HAM	23JBC	23KQC	23MRB	23PQH	23QQL	23QTO	23SQV
23HB0	23JBD	23KQD	23MS0	23PQJ	23QQM	23QTA	23SR0
23HBA	23JQ0	23KQE	23MSA	23PQK	23QQN	23QTB	23SRA
23HBB	23JQA	23KQF	23MSB	23PQL	23QQP	23QTC	23SRB
23HBC	23JQB	23KQG	23MSC	23PQM	23QQQ	23QTD	23SRC
23HBD	23JQC	23KQH	23MT0	23IQN	23QQR	23QTE	23SRD
23HBE	23JQD	23KQJ	23MTA	23PQP	23QQS	23QTF	23SRE
23HBF	23JQE	23KQK	23MTB	23PQQ	23QQT	23QTG	23SRF
23HBG	23JQF	23KQL	23MUA	23PQR	23QQU	23QTH	23SRG
23HBH	23JQG	23KQM	23MVF	23PQS	23QQV	23QTI	23SRH
23HQ0	23JQH	23KQN	23N00	23PQT	23QQW	23S00	23SRJ
23HQA	23JQJ	23KQP	23NQA	23PQU	23QQX	23SQA	23SRK
23HQB	23JQL	23KQQ	23NQC	23PQV	23QQY	23SQB	23SRL
23HQC	23JQM	23KQR	23NQD	23PQW	23QRO	23SQC	23SRM
23HQD	23JQN	23KQS	23NQE	23PQX	23QRA	23SQD	23SRN
23HQE	23JQP	23LA0	23NQF	23PQY	23QRB	23SQE	23SRP
23J00	23JQQ	23LAB	23NQG	23PQZ	23QRC	23SQF	23SRQ
23JA0	23JQR	23LAC	23NQH	23PRA			

System 41000 - Air Conditioning, Pressurization and Surface Ice Control

41000	41AE1	41B00	41BG1	41CD1	41D00	41E00	41FD1
41A00	41AF1	41BA1	41BJ1	41CE1	41DA1	41EA1	41FF1
41AA1	41AG1	41BB1	41C00	41CF1	41DC1	41EB1	41G00
41AB1	41AH1	41BC1	41CA1	41CG1	41DD1	41EC1	41GA1
41AC1	41AJ1	41BD1	41CB1	41CH1	41DE1	41ED1	41GB1
41AD1	41AK1	41BF1	41CC1	41CJ1	41DFA	41FA1	41GC1

System 41000 — Air Conditioning, Pressurization and Surface Ice Control (Continued)

41GD1	41GL1	41HC1	41LA1	41ME1	41NAD	41NCC	41PB1
41GE1	41GM1	41K00	41LC1	41MF1	41NAE	41ND0	41PC1
41GF1	41GN1	41KA1	41M00	41N00	41NB0	41NDA	41PD1
41GG1	41GP1	41KB1	41MA1	41NA1	41NBA	41NDB	41Q00
41GH1	41H00	41KC1	41MB1	41NAA	41NC0	41ND0	41QA1
41GJ1	41HA1	41KD1	41MC1	41NAB	41NCA	41P00	41QB1
41GK1	41HB1	41KE1	41MD1	41NAC	41NCB	41PA1	

System 42000 — Electrical Power

42000	42AH1	42B00	42CG1	42EA1	42EG1	42FD1	42FK1
42A00	42AJ1	42BA1	42CK1	42EB1	42EH1	42FE1	42FL1
42AD1	42AK1	42BE1	42CL1	42EC1	42F00	42FF1	42G00
42AE1	42AL1	42C00	42DA1	42ED1	42FA1	42FG1	42GA1
42AF1	42AM1	42CA1	42DB1	42EE1	42FB1	42FH1	42GB1
42AG1	42AN1	42CD1	42E00	42EF1	42FC1	42FJ1	

System 44000 — Lighting Systems

44000	44DB1	44DF1	44DK1	44EG1	44FE1	44FH1	44FN1
44D00	44DD1	44DG1	44EC1	44F00	44FF1	44FK1	44G00
44DA1	44DE1	44DH1	44EF1	44FC1	44FG1	44FM1	44GA1

System 45000 — Hydraulic and Pneumatic Power Supply System

45000	45AM1	45BC1	45BR1	45CF1	45ED1	45GB1	45JG1
45A00	45AN1	45BD1	45BSA	45CG1	45EE1	45GC1	45JGA
45AA1	45AP1	45BE1	45BS1	45CH1	45EEA	45GD1	45JGB
45AB1	45AQ1	45BF1	45BU1	45D00	45EF1	45HA1	45JH1
45AC1	45AR1	45BG1	45BV1	45DA1	45EG1	45HB1	45JJ1
45AD1	45ATA	45BGA	45BW1	45DB1	45EH1	45J00	45JK1
45AE1	45AT1	45BJ1	45C00	45DE1	45EJ1	45JA1	45JL1
45AF1	45AU1	45BJA	45CA1	45DH1	45EMA	45JB1	45JM1
45AG1	45AV1	45BK1	45CAA	45E00	45EM1	45JC1	45JN1
45AGA	45AW1	45BL1	45CB1	45EA1	45EN1	45JD1	45JP1
45AJ1	45B00	45BM1	45CC1	45EB1	45G00	45JE1	45JQ1
45AJA	45BA1	45BN1	45CD1	45EBA	45GA1	45JF1	45JR1
45AK1	45BB1	45BP1	44CE1	45EC1	45GAA	45JFA	45JRA
45AL1							

System 46000 — Fuel System

46000	46CH1	46D00	46GB1	46HAG	46JA1	46KA1	46P00
46A00	46CJ1	46DB1	46GC1	46HAH	46JAA	46KB1	46PB1
46AA1	46CK1	46DK1	46GD1	46HAK	46JAB	46LB1	46PC1
46AB1	46CL1	46DL1	46GE1	46HB1	46JAC	46LC1	46PD1
46AC1	46CP1	46DT1	46GF1	46HBA	46JAD	46M00	46PE1
46AD1	46CQ1	46DU1	46GG1	46HBB	46JAE	46MA1	46Q00
46AJ1	46CR1	46DV1	46GH1	46HBC	46JAF	46MB1	46QA1
46AK1	46CS1	46F00	46GJ1	46HBD	46JB1	46MC1	46QB1
46AP1	46CT1	46FA1	46GK1	46HC1	46JBA	46MD1	46QC1
46AQ1	46CU1	46FF1	46GL1	46HCA	46JBB	46ME1	46R00
46C00	46CV1	46FT1	46H00	46HCB	46JBC	46N00	46RA1
46CA1	46CW1	46FU1	46HA1	46HCC	46JC1	46NA1	46RB1
46CB1	46CX1	46FV1	46HAA	46HCD	46JD1	46NB1	46RC1
46CC1	46CY1	46FY1	46HAB	46HCE	46JE1	46NC1	46RD1
46CD1	46CZ1	46FZ1	46HAC	46HCF	46JF1	46ND1	46S00
46CE1	46CZ2	46FZ3	46HAD	46HCG	46JG1	46NE1	46SA1
46CF1	46CZ3	46G00	46HAE	46HCH	46JH1	46NF1	46SB1
46CG1	46CZ4	46GA1	46HAF	46J00	46K00	46NG1	

System 47000 — Oxygen System

47000	47AAB	47ACA	47AE1	47BAB	47BAK	47BAN	47CA1
47A00	47AAC	47ACB	47B00	47BAC	47BAL	47BAP	47CB1
47AA1	47AAD	47ACC	47BA1	47BAD	47BAM	47C00	47CD1
47AAA	47AC1	47AD1	47BAA	47BAJ			

System 49000 — Miscellaneous Utilities

49A00	49AAB	49AE1	49AH1	49AL1	49BA1	49BD1	49BG1
49AA1	49AC1	49AF1	49AJ1	49AM1	49BB1	49BF1	49BJ1
49AAA	49AD1	49AG1	49AK1				

System 51000 — Instruments, General

51000	51AG1	51BF1	51D00	51DE1	51DK1	51ED1	51FB1
51A00	51AH1	51C00	51DA1	51DF1	51E00	51EE1	51FC1
51AC1	51AJ1	51CA1	51DB1	51DG1	51EA1	51EF1	51FD1
51AD1	51B00	51CB1	51DC1	51DH1	51EB1	51F00	51G00
51AE1	51BA1	51CD1	51DD1	51DJ1	51EC1	51FA1	51GA1
51AF1	51BB1						

System 52000 — Autopilot (AFCS)

52000	52AH1	52BB1	52BH1	52CD1	52CK1	52DD1	52DK1
52A00	52AJ1	52BC1	52BJ1	52CE1	52D00	52DE1	52DL1
52AA1	52AK1	52BD1	52C00	52CF1	52DA1	52DF1	52EA1
52AB1	52AL1	52BE1	52CA1	52CG1	52DB1	52DG1	52EB1
52AE1	52AM1	52BF1	52CB1	52CH1	52DC1	52DH1	52EC1
52AF1	52B00	52BG1	52CC1	52CJ1	52DCA	52DJ1	52EE1
52AG1	52BA1						

System 55000 — Malfunction Analysis and Recording Equipment

55000	55AA1	55AC1	55AE1
55A00	55AB1	55AD1	55AF1

System 63000 — UHF Communications

63B00	63BA1	63BG1	63BK1
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System 65000 — IFF

65A00	65ACA	65ACJ	65AJ1	65BAB	65BAJ	65BCA	65BH1
65AA1	65ACB	65ACK	65AK1	65BAC	65BAK	65BCB	65BJ1
65AAA	65ACC	65ACL	65AL1	65BAD	65BAL	65BCD	65BK1
65AAB	65ACD	65AD1	65B00	65BAE	65BAM	65BD1	65BL1
65AAC	65ACE	65AE1	65BA1	65BAF	65BAN	65BE1	65BM1
65AAD	65ACF	65AF1	65BAA	65BAG	65BB1	65BF1	65BN1
65AAE	65ACG	65AG1		65BAH	65BC1	65BG1	65BP1
65AC1	65ACH	65AH1					

System 71000 — Radio Navigation

71000	71AC1	71BA1	71C00	71CF1	71DA1	71DH1	71FC1
71A00	71AD1	71BB1	71CA1	71CG1	71DC1	71DJ1	71GA1
71AA1	71AE1	71BC1	71CB1	71CH1	71DCV	71E00	71GB1
71AB1	71AF1	71BE1	71CC1	71CJ1	71DD1	71EB1	71GD1
71ABP	71AK1	71BF1	71CD1	71CK1	71DF1	71F00	71GE1
71ABT	71B00	71BH1	71CE1	71D00	71DG1		

System 74000 — Fire Control (AWCIS)

74000	74AB1	74AD1	74ADC	74ADF	74ADJ	74ADM	74ADQ
74A00	74AC1	74ADA	74ADD	74ADG	74ADK	74ADN	74ADR
74AA1	74ACA	74ADB	74ADE	74ADH	74ADL	74ADP	74ADS

System 74000 — Fire Control (AWCIS) (Continued)

74ADT	74APL	74ARV	74BMB	74CFB	74FAR	74FDR	74HC1
74ADW	74APM	74ARW	74BN1	74CG1	74FAS	74FDS	74HD1
74ADX	74APN	74ARX	74BNA	74CH1	74FAT	74FDT	74HE1
74ADY	74APP	74AS1	74BP1	74CHA	74FAU	74FDU	74HG1
74ADZ	74APR	74AT1	74BQ1	74CJ1	74FAV	74FDV	74HH1
74AEA	74APS	74ATA	74BR1	74CJA	74FAW	74FDW	74HJ1
74AEB	74APT	74ATB	74BRA	74CJB	74FAX	74FDX	74HL1
74AEC	74APU	74ATC	74BRB	74CJC	74FAY	74FDY	74HM1
74AED	74APV	74AU1	74BS1	74CJD	74FAZ	74FDZ	74HP1
74AEE	74APW	74AV1	74BT1	74CJE	74FA2	74FD2	74HQ1
74AEF	74APX	74AW1	74BU1	74DB1	74FA3	74FD3	74HR1
74AEG	74APY	74AX1	74BV1	74DC1	74FA4	74FD4	74HRA
74AEH	74APZ	74AY1	74BW1	74DCA	74FA5	74FD5	74HRB
74AEJ	74AP2	74AZ1	74BX1	74DCB	74FA6	74FD6	74HRC
74AEK	74AP3	74BA1	74BXA	74DCC	74FA7	74FD7	74HS1
74AEL	74AP4	74BAA	74BY1	74DCD	74FA8	74FD8	74HT1
74AEM	74AP5	74BAB	74BZ1	74DCE	74FB1	74FD9	74HTA
74AEN	74AP6	74BAC	74BZA	74DD1	74FC1	74FEA	74HTB
74AEP	74AP7	74BAD	74CA1	74DE1	74FCA	74FEB	74HU1
74AEQ	74AP8	74BAE	74CAA	74DF1	74FCB	74FF1	74HV1
74AER	74AQ1	74BB1	74CAB	74DG1	74FCC	74FFA	74HW1
74AES	74AR1	74BBA	74CAC	74DZ1	74FCD	74FFB	74HX1
74AF1	74ARB	74BC1	74CAD	74F00	74FCE	74FFC	74HXA
74AG1	74ARC	74BCA	74CAE	74FA0	74FCF	74FFD	74HY1
74AGA	74ARD	74BCB	74CB1	74FA1	74FD1	74FFE	74HZ1
74AGB	74ARE	74BCC	74CC1	74FAA	74FDA	74FFF	74K00
74AJ1	74ARF	74BCD	74CCA	74FAB	74FDB	74FFG	74KA1
74AK1	74ARG	74BCE	74CCB	74FAC	74FDC	74FFH	74KAA
74AL1	74ARH	74BD1	74CCC	74FAD	74FDD	74FFJ	74KAB
74ALA	74ARJ	74BE1	74CCD	74FAE	74FDE	74FFK	74KAC
74AN1	74ARK	74BF1	74CCE	74FAF	74FDF	74FFL	74KB1
74AP1	74ARL	74BG1	74CCF	74FAG	74FDG	74FFM	74KC1
74APA	74ARM	74BH1	74CCG	74FAH	74FDH	74FFN	74KCA
74APB	74ARN	74BJ1	74CCH	74FAJ	74FDJ	74FG1	74KCB
74APC	74ARP	74BK1	74CCJ	74FAK	74FDK	74FH1	74KD1
74APF	74ARQ	74BKA	74CCK	74FAL	74FDL	74FJ1	74KE1
74APG	74ARR	74BKB	74CCL	74FAM	74FDM	74FK1	74KEA
74APH	74ARS	74BL1	74CD1	74FAN	74FDN	74HQ0	74KEB
74APJ	74ART	74BM1	74CF1	74FAP	74FDP	74HA1	74KEC
74APK	74ARU	74BMA	74CFA	74FAQ	74FDQ	74HB1	74KED

System 74000 — Fire Control (AWCIS) (Continued)

74KF1	74KGE	74KGM	74KK1	74KR1	741'00	74PF1	74PL1
74KFB	74KGF	74KGN	74KL1	74LA1	74PA1	74PFA	74PM1
74KG1	74KGG	74KGP	74KM1	74LB1	74PB1	74PG1	74PN1
74KGA	74KGH	74KGQ	74KN1	74LC1	74PC1	74PH1	74PP1
74KGB	74KGJ	74KH1	74KP1	74LE1	74PD1	74PJ1	74QA1
74KGC	74KGK	74KJ1	74KQ1	74LG1	74PE1	74PK1	74QAA
74KGD	74KGL	74KJA	74CGA				

System 75000 — Weapons Delivery

75000	75BAB	75BHA	75DA1	75DCE	75GAB	75GH1	75JCA
75A00	75BAC	75BJ1	75DAA	75EA1	75GAC	75GHA	75JCB
75AA1	75BB1	75BJA	75DAB	75EAB	75GAD	75GHB	75JCC
75AAA	75BBA	75BJB	75DAC	75EAC	75GAE	75GJ1	75JCD
75AAB	75BBB	75BL1	75DAD	75EAD	75GAF	75GK1	75JD1
75AB1	75BBC	75BM1	75DAE	75EAE	75GB1	75GL1	75JE1
75ABA	75BC1	75C00	75DAF	75EAF	75GBA	75GM1	75JF1
75ABB	75BCA	75CA1	75DAG	75EB1	75GBB	75H00	75JG1
75AC1	75BCB	75CAE	75DAH	75EBA	75GBC	75HA1	75JH1
75AD1	75BD1	75CAF	75DAJ	75EBB	75GC1	75HB1	75K00
75AE1	75BDB	75CAG	75DAK	75EBC	75GCA	75HBA	75KAA
75AF1	75BDC	75CAJ	75DB1	75ECA	75GCB	75HBB	75KAB
75AFA	75BDD	75CB1	75DBA	75EF1	75GCC	75HBC	75KAC
75AFB	75BE1	75CBB	75DBB	75EG1	75GD1	75HBD	75KAD
75AG1	75BEB	75CBD	75DBC	75EH1	75GDA	75HBE	75KAE
75AGA	75BEC	75CBF	75DBD	75FB1	75GDB	75J00	75KAF
75AGB	75BF1	75CC1	75DBE	75FC1	75GDC	75JA1	75KAG
75AH1	75BFB	75CD1	75DBF	75FD1	75GE1	75JB1	75KB1
75AJ1	75BFC	75CED	75DC1	75FF1	75GF1	75JBA	75KBA
75AK1	75BFD	75CF1	75DCA	75FG1	75GFA	75JBB	75KBB
75B00	75BG1	75CG1	75DCB	75G00	75GFB	75JBC	75KBC
75BA1	75BGA	75CK1	75DCC	75GA1	75GFC	75JBD	75KC1
75BAA	75BH1	75D00	75DCD	75GAA	75GG1	75JC1	

System 93000 — Drag Chute Equipment

93A00	93AC1	93AEA	93AH1	93AL1	93AP1	93AS1	93AU1
93AA1	93AD1	93AF1	93AJ1	93AM1	93AQ1	93AT1	93AV1
93AB1	93AE1	93AG1	93AK1	93AN1	93AR1		

System 97000 — Explosive Devices and Components

97AA1	97AH1	97AN1	97AU1
97AC1	97AJ1	97AP1	97BC1
97AE1	97AM1	97AQ1	97BD1
97AF1			

Deleted Codes Previously Used for Existing Equipment

11A00	11AC1	11AG1	11AU1	63AK1
11AA1	11ACF	11AJ1	11AV1	63AP1
11AAA	11AD1	11AQ1	63AG1	63AM1
11AAB	11AE1	11AR1	63AH1	63AF1

ADDENDUM I

MODIFIED CALCULATION OF NUMBER OF SPECIAL INSPECTIONS PER INTERVAL

ADDENDUM I

MODIFIED CALCULATION OF NUMBER OF SPECIAL INSPECTIONS PER INTERVAL

The effectiveness model as originally formulated calculates the total number of manhours and NORM hours for each scheduled inspection interval in a maintenance program. These are then summed over all intervals to obtain total manhours and NORM for the maintenance program.

Although this approach is satisfactory for most types of maintenance, examination of the results documented in this report led to an alternative method giving more realistic results for special inspections. Applying the central limit theorem to the sum of n intervals, one can calculate the number of special inspections of each type in a scheduled inspection interval, ΔI , from

$$p_{\text{NSPC}}(n) = \sum_c \left[\eta \left(c; n\bar{\Delta I}_{\text{SW}}, \sqrt{n} \sigma_{\Delta I_{\text{SW}}} \right) - \eta \left(c; (n+1) \bar{\Delta I}_{\text{SW}}, \sqrt{n+1} \sigma_{\Delta I_{\text{SW}}} \right) \right] \cdot p_{\text{WK}/\Delta}(c)$$

The symbols are defined as follows:

- $p_{\text{NSPC}}(n)$ - probability density function for the number of special inspections of a specific type in ΔI .
- $p_{\text{WK}/\Delta}(c)$ - probability density function for the number of weeks per interval, ΔI .
- $\eta(a; \bar{x}, \sigma_x)$ - cumulative normal distribution with mean \bar{x} and standard deviation σ_x , evaluated at a .
- ΔI_{SW} - special inspection interval length in weeks, for a specific special inspection type.

The parameter c is varied in increments of one week.

This equation is valid only for long scheduled inspection intervals. A large ΔI results in a large number of special inspections for ΔI , and therefore the use of the central limit theorem is justified. Unfortunately, typical values of ΔI are too small for this theorem to apply. For these cases, the results obtained from the above equation are not realistic.

An alternative approach has been developed that gives valid results for all typical values of ΔI . This approach utilizes the aircraft service life in place of the scheduled inspection interval lengths for all types of special inspections. An interval of two maintenance program lengths appears to be a satisfactory value for service life; longer intervals would greatly increase computer running time without significantly improving the accuracy of the results.

In this new method, $p_{\text{NSPC}}^{(n)}$ is defined as the density function for the number of special inspections per service life. This is given by

$$p_{\text{NSPC}}^{(n)} = \sum_c \left[\eta \left(c; \overline{n\Delta I}_{\text{SW}}, \sqrt{n} \sigma_{\Delta I_{\text{SW}}} \right) - \eta \left(c; (n+1) \overline{\Delta I}_{\text{SW}}, \sqrt{n+1} \sigma_{\Delta I_{\text{SW}}} \right) \right] \cdot p_{\text{WK/SL}}^{(c)}$$

where

$$p_{\text{WC/SL}}^{(c)} = P_r \left\{ \text{No. of weeks} \in \text{service life} = c \right\} \\ = \exp \left\{ - \left(c - \overline{\text{WK/SL}} \right)^2 / 2 \sigma_{\text{WK/SL}}^2 \right\} / \left(\sqrt{2\pi} \sigma_{\text{WK/SL}} \right)$$

using

$$\overline{\text{WK SL}} = 2 \cdot \text{NINT} \cdot \overline{\text{WK}/\Delta}, \sigma_{\text{WK/SL}}^2 = 2 \cdot \text{NINT} \cdot \sigma_{\text{WK}/\Delta}^2$$

It follows that the distribution for special inspection manhours per ΔI for each special inspection type has the mean and variance given by

$$\overline{\text{MH}_{\text{SPEC}/\Delta}} = \overline{\text{NSPC}} \cdot \overline{\text{MH/SP}} / (2 \cdot \text{NINT}) \\ \sigma_{\text{MH}_{\text{SPEC}/\Delta}}^2 = \left[\overline{\text{NSPC}} \cdot \sigma_{\text{MH/SP}}^2 + \sigma_{\text{NSPC}}^2 \cdot \overline{\text{MH/SP}}^2 \right] / (2 \cdot \text{NINT}),$$

where

NSPC = Number of special inspections of a specific type per service life.
 NINT = number of ΔI 's per maintenance program period.
 MH/SP = manhours per special inspection of the type under consideration.

The parameters for special inspection NORM per ΔI are found in the same way.

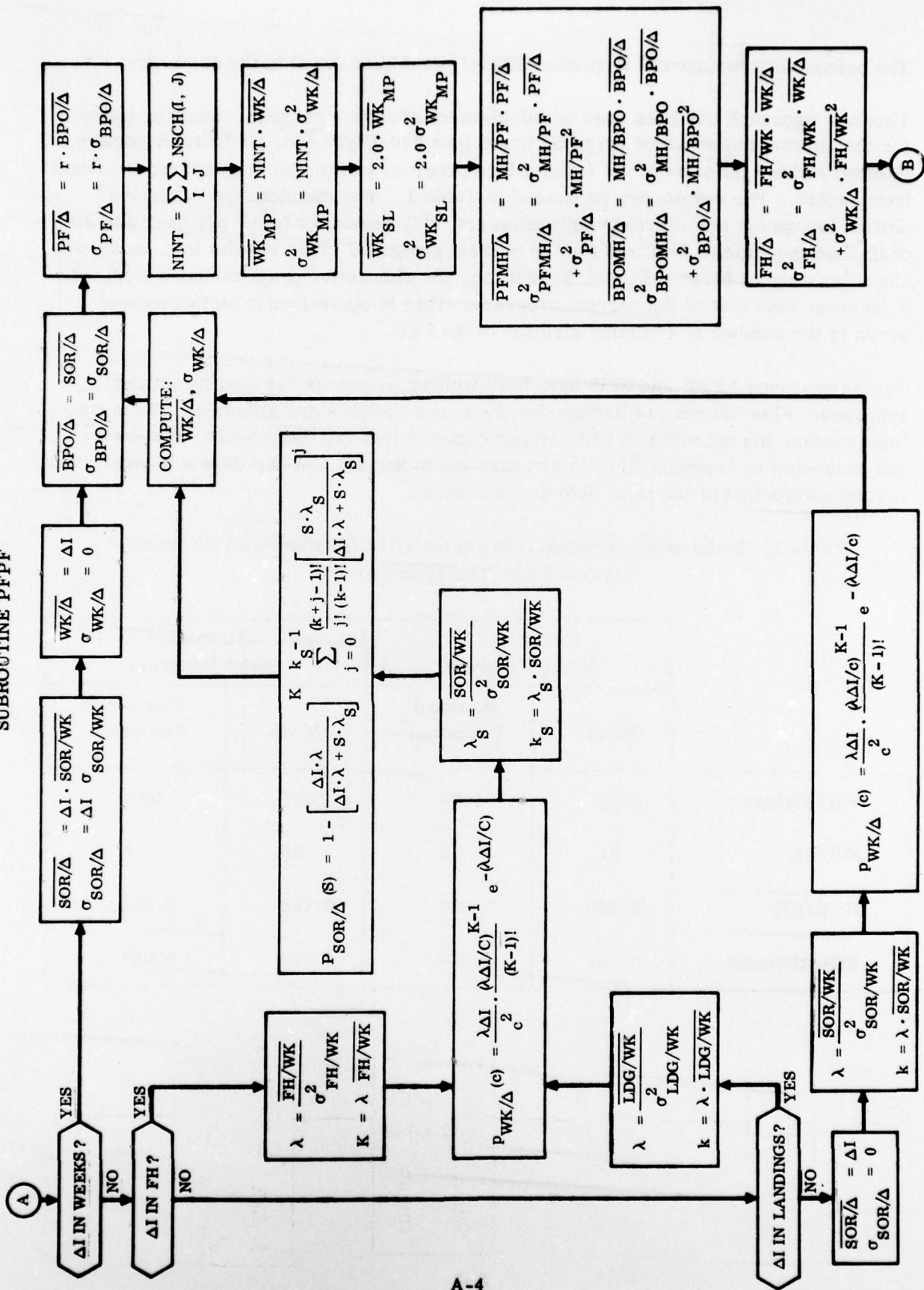
This new approach has been used to calculate maintenance program characteristics for the current maintenance program based on a 300-flight-hour periodic inspection interval and for the alternative maintenance program with major inspections 400 flight hours apart. The results are presented in Table 1. The maintenance manhours needed to support the alternative program are 1052 manhours fewer per year per aircraft than the number required for the current program. This results in an expected annual savings of \$2.46 million. In addition, the alternative program has a NOR rate 0.03 lower than that of the current program. This is equivalent to an increase of seven in the number of available aircraft in the field.

New subroutines PFPF and SPIS have been written incorporating the alternative approach. Flow charts and listings for these new routines are attached. These routines replace the subroutines with the same names that are described in Section 2 and presented in Appendix III of this report and in Section 5 of the User's Manual. The content and format of the input data are unchanged.

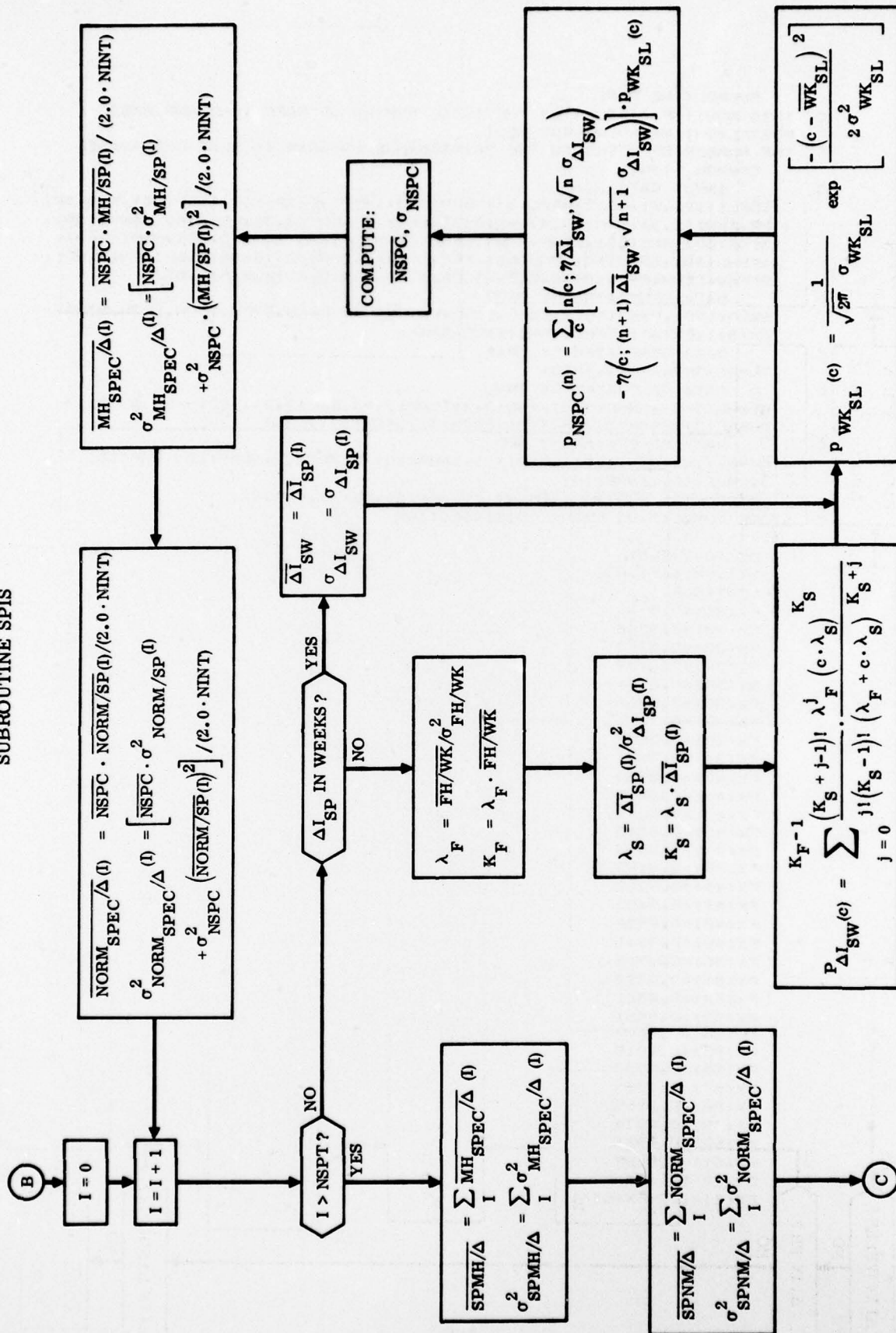
Table 1. Maintenance Program Characteristics Obtained with Alternative Approach for Special Inspections

	Current Maint Program		Alternative Maint Program	
	Mean	Standard Deviation	Mean	Standard Deviation
MH/YR/AC	4627	1078	3575	1004
MH/FH	21	5	16	5
NOR/HR	0.220	0.060	0.190	0.054
Effectiveness	0.731	0.089	0.763	0.068

SUBROUTINE PFPF



SUBROUTINE SPIS



```

      SUBROUTINE PFPF
C   THIS ROUTINE CALCULATES THE TOTAL NUMBER OF PREFLIGHT AND BASIC
C   POSTFLIGHT MANHOURS FOR DELI.
C   THE NUMBER OF WEEKS IN THE MAINTENANCE PROGRAM IS ALSO DETERMINED
      COMMON IINT.
C   INPUT DATA
      1DEL1(10),KI,NSCT,NFOL(3),NSCH(3,3),NSPT,DISP(60),SISP(60),KIS(60),
      2R,EMHI(3,3),SMHI(3,3),AN(3,3),BN(3,3),SNI(3,3),EMHS(60),SMHS(60),
      3ENS(60),SNS(60),EMHP,SMHP,EMHB,SMHB,NI,KSET,ANU(3,60),BNU(3,60),
      4FMHU(60),SMHU(60),FNU(60),SNU(60),ANAB(3,60),BNAB(3,60),ENWK(60),
      5FFHW,SFHW,ESOW,SSOW,ELDW,SLDW,AIES,DIK(3,60),UMAS(3,60),
C   DATA GENERATED BY PFPF
      6WKD(150),PWKD(150),EWKD,SWKD,EWKM,SWKM,EPFH,SPFH,EBPH,SBPH,NINT,
      6X(61),FX(61),EFHD,VFHD,FWKS,SWKS,
C   DATA GENERATED BY SPIS
      7FMSD,SMSD,ENSD,SNSD,
C   DATA GENERATED BY INVL
      8FMHD(3,3),SMHD(3,3),END(3,3),SND(3,3),EED(3,3),SED(3,3),DD(3),
      8UMAC(3),EACM(3),SACM(3),EACN(3),SACN(3),ACNS,
C   DATA GENERATED BY MPD
      9FMHY(10),SMHY(10),ENHR(10),SNHR(10),EEMP(10),SEMP(10),DMP(10),
      9FMHF(10),SMHF(10)
      DIMENSION SOD(100),PSOD(100),KF(2),KS(2),PP(2,2)
C   STORE CUMULATIVE NORMAL DISTRIBUTION
      1 X(1)=-3.0
      DO 10 I=2,61
        X(I)=X(I-1)+0.1
      10 CONTINUE
      FX(31)=0.5
      FX(32)=0.5398
      FX(33)=0.5793
      FX(34)=0.6179
      FX(35)=0.6554
      FX(36)=0.6915
      FX(37)=0.7257
      FX(38)=0.7580
      FX(39)=0.7881
      FX(40)=0.8159
      FX(41)=0.8413
      FX(42)=0.8643
      FX(43)=0.8849
      FX(44)=0.9032
      FX(45)=0.9192
      FX(46)=0.9332
      FX(47)=0.9452
      FX(48)=0.9554
      FX(49)=0.9641
      FX(50)=0.9713
      FX(51)=0.9772
      FX(52)=0.9821
      FX(53)=0.9861
      FX(54)=0.9893
      FX(55)=0.9918
      FX(56)=0.9938
      FX(57)=0.9953
      FX(58)=0.9965
      FX(59)=0.9974
      FX(60)=0.9981
      FX(61)=0.9987
      DO 20 I=1,30
        FX(I)=1.0-FX(62-I)

```

```

20 CONTINUE
  IF(KI-2) 100,200,30
30 IF(KI-4) 300,400,1000
C  INTERVAL IS IN WEEKS
100 ESOD=DELI(IINT)*ESOW
  SSOD=DELI(IINT)*SSOW
  FWKD=DELI(IINT)
  SWKD=0.0
  DO 110 I=1,149
    WKN(I)=I
    PWKD(I)=0.0
110 CONTINUE
    WKN(150)=EWKD
    PWKD(150)=1.0
    GO TO 600
C  INTERVAL IS IN FLIGHT HOURS
200 IF(SFWH) 220,220,201
201 RL=EFHW/(SFWH*SFWH)
  RK=EFHW*RL
205 KL=RK
  KH=KL+1
  C=DELI(IINT)
  DO 210 I=1,150
    WKN(I)=I
    DC= C/WKD(I)
    IF(RK) 208,208,206
206 PP=RL*DC*EXP(-RL*DC)/WKD(I)
  PL=PP*(RL*DC)**(KL-1)
  PH=PL*RL*DC
  KEND=KL-1
  DO 207 J=2,KEND
    PL=PL/J
    PH=PH/J
207 CONTINUE
  PH=PH/KL
  PWKD(I)=PL+(PH-PL)*(RK-KL)
  GO TO 210
208 PWKD(I)=RL*DC*EXP(-RL*DC)/WKD(I)
210 CONTINUE
  GO TO 500
220 PWKD(1)=-101.
  FWKD=DELI(IINT)/EFHW
  SWKD=0.0
  GO TO 475
C  INTERVAL IS IN SORTIES
300 ESOD=DELI(IINT)
  SSOD=0.0
  IF(SSOW) 320,320,301
301 RL=ESOW/(SSOW*SSOW)
  RK=ESOW*RL
  GO TO 205
320 FWKD=DELI(IINT)/ESOW
  SWKD=0.0
  PWKD(1)=-101.
  GO TO 600
C  INTERVAL IS IN LANDINGS
400 IF(SLDW) 420,420,401
401 RL=ELDW/(SLDW*SLDW)
  RK=ELDW*RL
  GO TO 205
420 FWKD=DELI(IINT)/ELDW

```

```

      SWKD=0.0
      PWKD(1)=-101.
475  IF(SSOW) 480,480,490
480  ESOD=ESOW*EWKD
      SSOD=0.0
      GO TO 600
490  PL=FSOW/(SSOW*SSOW)
      RK=FSOW*RL
      KL=RK
      KFND=KL-1
      FACT=RL/FWKD
      DO 498 I=1,100
      SOD(I)=4.*I
      FAC=FACT*SOD(I)
      IF(KEND) 496,496,491
491  SUM=1.0
      TERM=1.0
      DO 492 J=1,KEND
      TERM=TERM*FAC/J
      SUM=SUM+TERM
492  CONTINUE
      PL=SUM
      PH=SUM+TERM*FAC/KL
      TP=PL+(PH-PL)*(RK-KL)
      PSOD(I)=1.-EXP(-FAC)*TP
      GO TO 498
496  PSOD(I)=1.-EXP(-FAC)
498  CONTINUE
      GO TO 555
500  IF(SSOW) 532,532,511
511  RL SW=FSOW/(SSOW*SSOW)
      RK SW=ESOW*RL SW
      KF(1)=RK
      KF(2)=KF(1)+1
      KS(1)=RK SW
      KS(2)=KS(1)+1
      IF(KF(1)) 440,440,442
440  KF(1)=1
      RK=1.
442  IF(KS(1)) 444,444,446
444  KS(1)=1
      RK SW=1.
446  DO 530 I=1,100
      SOD(I)=I*4.0
      TOP=RL SW*SOD(I)
      BOT=PL*DELI(IINT)+TOP
      DEN=TOP/BOT
      DO 524 LS=1,2
      KFND=KS(LS)-1
      DO 522 LF=1,2
      KK=KF(LF)
      C=(DELI(IINT)*RL/BOT)**KK
      SUM=C
      IF(KEND) 520,520,447
447  DO 448 J=1,KEND
      C=C*DEN*(KK+J-1)/J
      SUM=SUM+C
448  CONTINUE
520  PP(LS,LF) =SUM
522  CONTINUE
524  CONTINUE

```



```

      SUBROUTINE SPIS
      COMMON IINT,
C      INPUT DATA
      1DFLI(10),KI,NSCT,NFOL(3),NSCH(3,3),NSPT,DISP(60),SISP(60),KIS(60),
      2R,EMHI(3,3),SMHI(3,3),AN(3,3),BN(3,3),SNI(3,3),EMHS(60),SMHS(60),
      3FNS(60),SNS(60),EMHP,SMHP,EMHB,SMHB,NI,KSET,ANU(3,60),BNU(3,60),
      4FMHU(60),SMHU(60),ENU(60),SNU(60),ANAB(3,60),BNAB(3,60),ENWK(60),
      5FFHW,SFHW,ESOW,SSOW,ELDW,SLDW,AIES,DIK(3,60),UMAS(3,60),
C      DATA GENERATED BY PPF
      6WKD(150),PWKD(150),EWKD,SWKD,EWK,SWKM,EPFH,SPFH,EBPH,SBPH,NINT,
      6X(61),FX(61),EFHD,VFHD,FWKS,SWKS,
C      DATA GENERATED BY SPIS
      7FMSD,SMSD,FNSD,SNSD,
C      DATA GENERATED BY INVL
      9FMHD(3,3),SMHD(3,3),END(3,3),SND(3,3),EED(3,3),SED(3,3),DD(3),
      8UMAC(3),EACM(3),SACM(3),EACN(3),SACN(3),ACNS,
C      DATA GENERATED BY MPD
      9FMHY(10),SMHY(10),ENHR(10),SNHR(10),EEMP(10),SEMP(10),DMP(10),
      9,FMHF(10),SMHF(10)
      DIMENSION DISW(150),PISW(150),PNSP(1000),KS(2),KF(2),PP(2,2)
      FMSD=0.0
      SMSD=0.0
      FNSD=0.0
      SNSD=0.0
      DO 100 I=1,NSPT
      IF(KIS(I)-2) 10,20,1000
C 1TH INTERVAL IN WEEKS
      10 E1WK=DISP(I)
      S1WK=SISP(I)
      GO TO 50
C 1TH INTERVAL IN FLIGHT HOURS
      20 IF(SFHW) 400,400,21
      21 IF(SISP(I)) 42,42,25
      25 RLSP=DISP(I)/(SISP(I)*SISP(I))
      PKSP=RLSP*DISP(I)
      RLEW=EFHW/(SFHW*SFHW)
      PKFW=EFHW*RLEW
      KS(1)=RKSP
      KS(2)=KS(1)+1
      KF(1)=RKFW
      KF(2)=KF(1)+1
      IF(KF(1)) 26,26,27
      26 KF(1)=1
      PKFW=1.
      27 IF(KS(1)) 28,28,29
      28 KS(1)=1
      PKSD=1.
      20 DO 40 J=1,150
      DISW(J)=J
      DO 35 JF=1,2
      KFND=KF(JF)-1
      DO 34 JS=1,2
      KK=KS(JS)
      DEN=RLFW+RLSP*J
      C=(RLSP*J/DEN)**KK
      DEN=RLFW/DEN
      SUM=C
      IF(KEND) 32,32,30
      30 DO 31 JI=1,KEND
      C=C*DEN*(KK+JI-1)/JI
      SUM=SUM+C

```

```

31 CONTINUE
32 PP(JF,JS)=SUM
34 CONTINUE
35 CONTINUE
   DKS=RKSP-KS(1)
   PL=PP(1,1)+(PP(1,2)-PP(1,1))*DKS
   PH=PP(2,1)+(PP(2,2)-PP(2,1))*DKS
   PISW(J)=PL+(PH-PL)*(RKFW-KF(1))
40 CONTINUE
   GO TO 602
42 RLFW=EFHW/(SFHW*SFHW)
   RKFW=EFHW*RLFW
   KLFW=RKFW
   KHFW=KLFW+1
   KFND=KLFW-1
   DO 48 J=1,150
   DISP(J)=J
   IF(RKFW-1.) 45,43,43
43 FAC=RLFW*DISP(1)/J
   SUM=1.0
   TERM=1.0
   DO 44 K=1,KEND
   TERM=TERM*FAC/K
   SUM=SUM+TERM
44 CONTINUE
   PL=EXP(-FAC)*SUM
   SUM=SUM+TERM*FAC/KLFW
   PH=EXP(-FAC)*SUM
   PISW(J)=PL+(PH-PL)*(RKFW-KLFW)
   GO TO 48
45 PISW(J)=EXP(-RLFW*DISP(J)/J)
48 CONTINUE
   GO TO 602
400 IF(SISP(1)) 410,410,415
410 EIWK=DISP(1)/EFHW
   SIWK=0.0
   GO TO 50
415 RLSP=DISP(1)/(SISP(1)*SISP(1))
   RKSP=DISP(1)*RLSP
   KLSP=RKSP
   KHSP=KLSP+1
   KFND=KLSP-1
   DO 420 J=1,150
   DISP(J)=J
   IF(RKSP-1.) 419,416,416
416 FAC=RLSP*EFHW/J
   SUM=1.0
   TERM=1.0
   DO 418 K=1,KEND
   TERM=TERM*FAC/K
   SUM=SUM+TERM
418 CONTINUE
   PL=1.-EXP(-FAC)*SUM
   SUM=SUM+TERM*FAC/KLSP
   PH=1.-EXP(-FAC)*SUM
   PISW(J)=PL+(PH-PL)*(RKSP-KLSP)
   GO TO 420
419 PISW(J)=1.-EXP(-RLSP*EFHW/J)
420 CONTINUE
602 NA=150
   CALL MNDV(DISW,PISW,NA,EIWK,SIWK)

```

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C  CALCULATE NUMBER OF SPECIAL INSPECTIONS PER INTERVAL
C  PNSP(K) IS THE PROBABILITY THAT THE NUMBER OF INSPECTIONS IS
C  EQUAL TO NMIN+1+K
50  CMIN=FWKS-3.0*SWKS
    CMAX=FWKS+3.0*SWKS
    F2=FIWK*EIWK
    IF(SIWK) 200,200,55
55  S9=0.0*SIWK*SIWK
    CI=2.*CMIN*FIWK
    NMIN=CI+S9-SIWK*3.*SQRT(2.*CI+S9)
    NMIN=NMIN/2./F2
    CI=2.*CMAX*FIWK
    NMAX=CI+S9+SIWK*3.*SQRT(2.*CI+S9)
    NMAX=NMAX/2./F2
    IF(CMIN) 51,51,52
51  CMIN=1.0
    NMIN=1
52  IF(NMAX-NMIN-999) 54,54,53
53  NMAX=NMIN+999
54  IF(NMIN) 57,58,58
57  NMIN=1
58  NLO=1
    NHI=NMAX-NMIN+1
    DO 61 J=NLO,NHI
    PPP=0.0
    NSP=J+NMIN-1
    F=NSP*EIWK
    F1=(NSP+1)*EIWK
    S=SQRT(FLOAT(NSP))*SIWK
    S1=SQRT(FLOAT(NSP+1))*SIWK
    IF(PWKD(1)+10.) 155,56,56
155 CALL NML(EWKS,F,S,P)
    CALL NML(EWKS,F1,S1,P1)
    PPP=PPP+(P-P1)
    GO TO 160
56  MINC=1
    MAXC=CMAX-CMIN+1.0
    DO 60 K=MINC,MAXC
    C=K+CMIN-1.0
    CALL NML(C,E,S,P)
    CALL NML(C,F1,S1,P1)
    PWR=(C-EWKS)**2/(2.*SWKS*SWKS)
    PPP=PPP+(P-P1)*EXP(-PWR)*0.3989423/SWKS
60  CONTINUE
160 PNSP(J)=PPP
61  CONTINUE
    GO TO 300
200 IF(PWKD(1)+10.) 210,210,220
210 ENN=EWKS/EIWK
    SNN=0.0
    GO TO 314
220 NMIN=CMIN/EIWK
    NMAX=CMAX/EIWK
    IF(CMIN) 221,221,222
221 CMIN=1.0
    NMIN=1
222 IF(NMAX-NMIN-999) 224,224,223
223 NMAX=NMIN+999
224 IF(NMIN) 225,226,226
225 NMIN=1
226 NLO=1

```

```

NH1=NMAX-NMIN+1
DO 250 J=NLO,NH1
PPP=0.
NSP=J+NMIN-1
MINC=1
MAXC=CMAX-CMIN+1.0
DO 240 K=MINC,MAXC
C=K+CMIN-1.0
IF (C-(NSP-1)*EIK) 240,230,230
230 IF (C-NSP*EIK) 235,240,240
235 PWR=(C-EWKS)**2/(2.*SWKS*SWKS)
PPP=PPP+EXP(-PWR)*0.3989423/SWKS
240 CONTINUE
PNSP(J)=PPP
250 CONTINUE
300 ENN=0.0
SNN=0.0
DO 310 J=NLO,NH1
NSP=J+NMIN-1
ENN=ENN+NSP*PNSP(J)
SNN=SNN+NSP*NSP*PNSP(J)
310 CONTINUE
SNN=SQRT(SNN-ENN*ENN)
C CALCULATE SPECIAL INSPECTION MANHOURS AND NORM PER INTERVAL
314 FMSD=ENN*EMHS(I)+FMSD
SMSD=ENN*SMHS(I)*SMHS(I)+SNN*SNN*EMHS(I)*EMHS(I)+SMSD
FNSD=ENN*FNS(I)+FNSD
SNSD=ENN*SNS(I)*SNS(I)+SNN*SNN*FNS(I)*FNS(I)+SNSD
100 CONTINUE
FMSD=FMSD/2.0/NINT
FNSD=FNSD/2.0/NINT
SMSD=SQRT(SMSD/2.0/NINT)
SNSD=SQRT(SNSD/2.0/NINT)
RETURN
C C C C C C C C C C C C C C C C C C C C C C C C C C C C
C THE VARIABLES TO BE USED IN OTHER ROUTINES ARE
C FMSD,SMSD MEAN AND STD DEV FOR SPECIAL INSPECTION MANHOURS PER
C INTERVAL
C FNSD,SNSD MEAN AND STD DEV FOR SPECIAL INSPECTION NORM PER
C INTERVAL
C C C C C C C C C C C C C C C C C C C C C C C C C C C C
1000 STOP
END

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